ImageQuest

Q770

Multiscanning Color Monitor

TECHNICAL SERVICE MANUAL

HYUNDAI

http://hyundaiQ.com

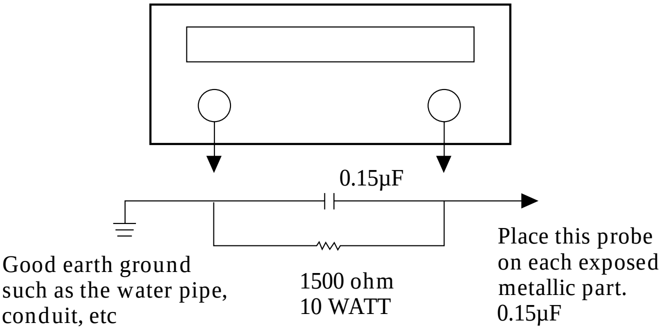
Safety Precaution

WARNING

Service should not be attempted by anyone unfamiliar with the necessary precautions on this monitor. The followings are the necessary precautions to be observed before servicing.

1. Always discharge the high voltage to the CRT conductive coating before handling the CRT. The picture tube is highly evacuated and if broken, glass fragments will be violently exploded. Use shatter proof goggles and keep picture tube away from the bare body while handling.
2. When replacing a chassis in the cabinet, always be certain that all the protective devices are put back in place, such as nonmetallic control knobs, insulating covers, shields, isolation resistor capacitor network etc.
3. Before returning the monitor to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as signal connectors, terminals, screw heads, metal overlays, control shafts etc, to be sure the monitor is safe to operate without danger of electrical shock. Plug the AC line cord directly into a AC outlet (do not use a line isolation trasformer during this check.). Use an AC voltmeter having 1500 ohm per volt or more sensitivity in the following manner : Connect ground(water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC Voltage across the combination of 1500 ohm resistor and 0.15㎌ capacitor. Reverse the AC plug at the AC outlet and repeat AC voltage measurements for each exposed metallic part. The Voltage must not exceed 0.3 volts RMS. This corresponds to 0.2 milliamp AC. Any value exceeded this limit constitutes a potential shock hazard and must be corrected immediately.

AC VOLTMETER


0.15μF
Good earth ground such as the water pipe, conduit, etc
1500 ohm
10 WATT
Place this probe on each exposed metallic part.
0.15μF

INSTRUCTIONS TO USER

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instruction, may cause interference to radio and television. It has been tested and found to comply with the limits for the specifications in Subpart J of Part 15 FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures.

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

X-Ray Radiation Precaution

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must be under the specified limit. The nominal value of the high voltage of this monitor is 25KV ±1.0KV at zero beam current(minimun brightness) under a 120V AC power source. The high voltage must not(under any circumstances) exceed30KV. Each time a monitor requires servicing, the high voltage should be checked.
   It is recommended the high voltage be recorded as a part of the service record. It is important to use an accurate and reliable high voltage meter.
2. This monitor is equipped with a protection circuit which prevents the monitor from producing excessively high voltage. Each time the monitor is serviced, the protection circuit must be checked to determine that the circuit is properly functioning.
3. The only source of X-RAY RADIATION in this monitor is the picture-tube.
   For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.
4. Some parts in this monitor have special safety-related characteristics for X-RAY RADIATION protection.
   For continued safety, parts replacement should be undertaken only after referring to the product safety notice.

RODUCT SAFETY NOTICE

Many electrical and mechanical parts in this monitor have special safety-related characteristics. These characteristics are often not evident from visual inspection.
Replacement parts which have these special safety characteristics are identified in this manual; electrical components having such features identified by "⚠" in the replacement parts list and schematic diagram.
For continued protection, replacement parts must be identical to those used in the original circuit. The use of substitute replacement parts which dose not have the same safety characteristics as the factory recommended replacement parts shown in this service manual, may create shock, fire, X-RAY RADIATION or other hazards.

PRODUCT CDRH NOTICE

Electrical potentiometers which is marked as caution "⚠" in parts list are censored crititial components of safety & CDRH.
Therefore, for continued protection, replacements parts must be used it which is used in original PCB ASS'Y.

General Inforormation

1. Description

This 17" (16" viewable) color display monitor is operated in R, G, B, drive mode input.

2. Operating instructions

2-1. Front

Menu, Select,Down (▼),Up(▲) DPMS(Power)LED, Power Switch

2-2. Rear

Input connection 〔AC & SIGNAL CABLE〕

2-3 Service Instruction(internal controls)

H-Center , H / V Focus

2-4. OSD Controls

Brightness / Contrast, H / V-Position, H / V-Size, Pincushion / Trapezoid, Pin Balance, Parallel, Top / Botton-Corner, H / V-LinearityRotation, H / V Moire, Degauss, Color Control, Information, Language, OSD H / V- Position ,Recall

3. Electrical Characteristics

3-1. Power supply

Input Voltage : 100-240 V AC
Input Current : 1.5A Max.
Input Frequency : 50 - 60Hz
Power Consumption : 70W (TYP)

3-2. Video input signal

Input : 0.7 Vp-p analog signal(at 75 ohm terminated to ground)
Polarity : Positive
Rise / Fall time : < 5ns

3-3. Horizontal Synchronization Signal

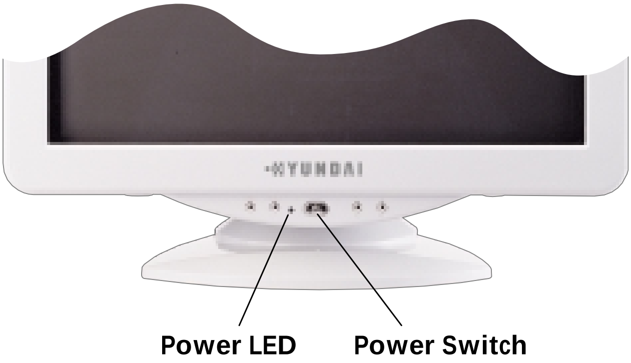
Level : TTL High : 2.4V min
Low : 0.4V max
Polarity : Negative or Positive
! Frequency : 30kHz - 70kHz
Timing Limits : Pulse width (0.1μs ≤ Thp ≤ 6μs)

3-4. Vertical Synchronization Signal

Level : TTL High : 2.0V min
Low : 0.4V max
Polarity : Negative or Positive
Frequency : 50Hz - 150Hz
Timing Limits : Pulse width (8μs ≤ Tvp ≤ 2.048ms)

Control Desciption

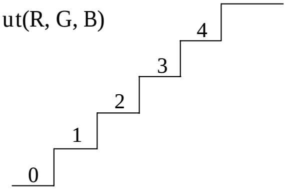
Front View

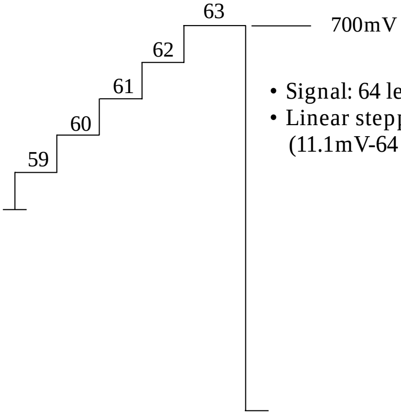

HYUNDAI
Power LED
Power Switch

Video Input Signal

Recommended signals are shown below.

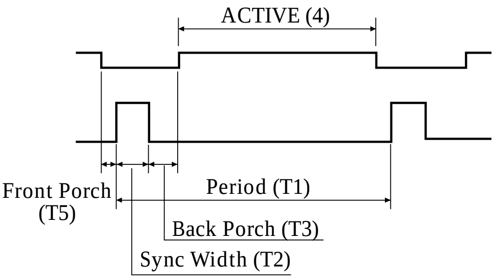
- **Video Signal**
  Video Level : 0 to 700mV
  Polarty : Positive
  Video Input : RGB separated
  Analog level
  Sync input : H-Sync ; TTL level
  V-Sync ; TTL level
- **Waveform**
  Video input(R, G, B)



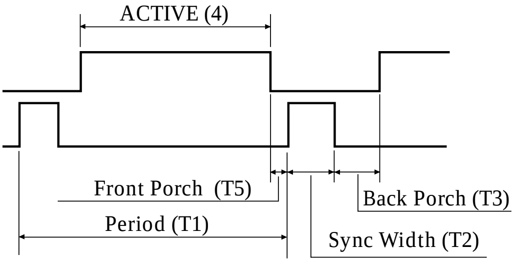

59
60
61
62
63
700mV

- Signal: 64 level gray scale
- Linear stepping:
  (11.1mV-64 Steps)

- **H-Sync**


ACTIVE (4)
Front Porch
(T5)
Period (T1)
Back Porch (T3)
Sync Width (T2)

- **V-Sync**


ACTIVE (4)
Front Porch (T5)
Period (T1)
Back Porch (T3)
Sync Width (T2)

• Timing Table

Horizontal	Dot	720	640	640	800	800	800	1024	1024
Frequency	kHz	31.469	43.269	50.625	46.875	53.674	63.920	60.023	68.677
Period(T1)	µs	31.778	23.111	19.752	21.333	18.631	15.645	16.660	14.561
Sync Width(T2)	µs	3.813	1.556	1.580	1.616	1.138	1.185	1.219	1.016
Back Porch(T3)	µs	1.907	2.222	1.975	3.232	2.702	2.015	2.235	2.201
Active(T4)	µs	25.422	17.778	15.802	16.162	14.222	11.852	13.003	10.836
Front Porch(T5)	µs	0.636	1.556	0.395	0.323	0.569	0.593	0.203	0.508

Vertical	Line	400	480	480	600	600	600	768	768
Frequency	Hz	70.080	85.008	100.05	75.000	85.061	100.03	75.029	84.997
Period(T1)	ms	14.268	11.764	9.995	13.333	11.756	9.997	13.328	11.765
Sync Width(T2)	ms	0.064	0.069	0.059	0.064	0.056	0.063	0.050	0.044
Back Porch(T3)	ms	1.081	0.570	0.435	0.448	0.503	0.501	0.466	0.524
Active(T4)	ms	12.711	11.093	9.481	12.800	11.179	9.387	12.795	11.183
Front Porch(T5)	ms	0.413	0.023	0.020	0.021	0.019	0.047	0.017	0.015
Interlaced	ms	1.577	0.671	0.514	0.553	0.577	0.610	0.533	0.582
Sync Polar	H	-	-	-	+	+	+	+	+
	V	+	-	-	+	+	+	+	+
Interlaced	Y/N	N	N	N	N	N	N	N	N

The monitor is compatible with additional modes within the specified frequency ranges provided that they are different at least for one of the following :

Horizontal Freq.: ±1.0kHz

Vertical Freq.: ±1Hz

Note: Even if the monitor detects the input timing as a factory preset mode, the size and position may not be able to be set as desired. Check the input timings are under the specifications and adjust the image as you want.

For better quality of display image, use the timing and polarity shown in the table above. Please see your video card user's guide to ensure compatibility.

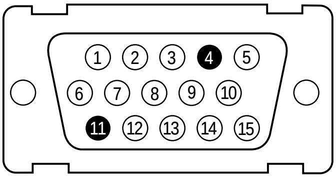
Video Input Terminal

A 15 Pin D-sub male connector is used as the input signal connector.
Pin and input signals are shown in the table below.

Pin Description

SIGNAL / PIN NO.	SEPERATE SYNC	COMPOSITE SYNC
1	RED	RED
2	GREEN	GREEN
3	BLUE	BLUE
4	N.C	N.C
5	DDC RETURN	DDC RETURN
6	RED GROUND	RED GROUND
7	GREEN GROUND	GREEN GROUND
8	BLUE GROUND	BLUE GROUND
9	+5	+5
10	LOGIC GROUND	LOGIC GROUND
11	N.C	N.C
12	SDA	SDA
13	H-SYNC(TTL)	(H+V) SYNC
14	V-SYNC(VCLK)	VCLK
15	SCL	SCL

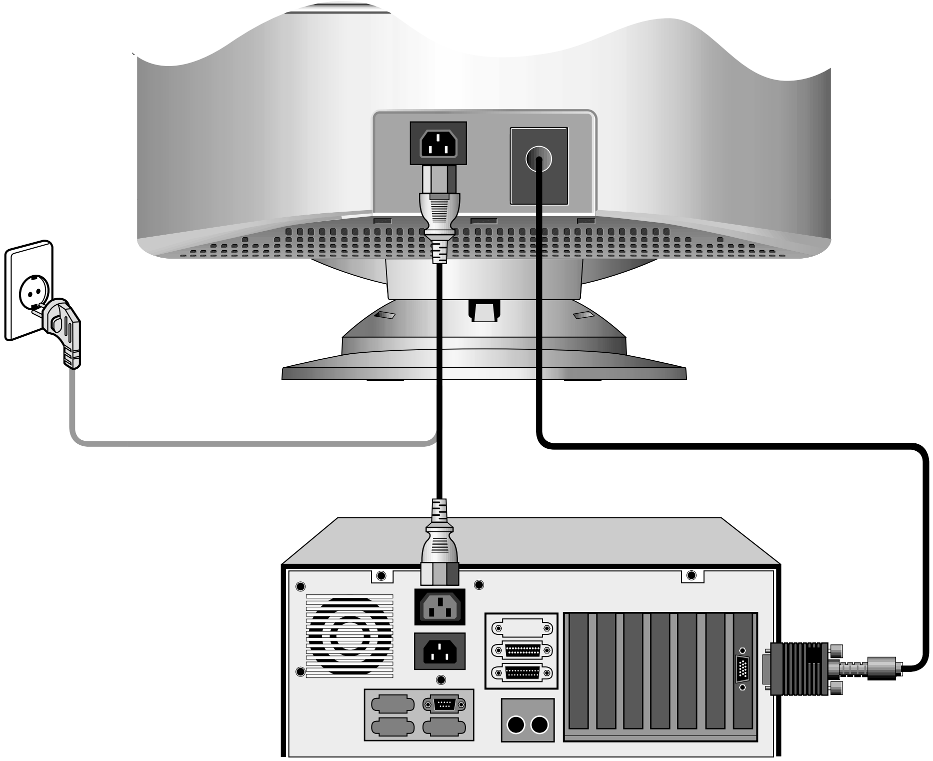
D-Sub male connector



Connecting With External Equipment

Cautions

Be sure to turn off the power of your computer before connecting the monitor.



Theory of Operation

1. Power Supply

The AC line voltage range is from 100V to 240V.
The SMPS has +55V, +7.0V, +14V,+5V, -12V
The conducted noise is filtered by X(CP01, CP04) and Y (CP02, CP03, CP32, CP33, CP09)capacitors and a common mode line filter (LP01).
The input rectifier (DP01～DP04) converts the AC line voltage into a DC voltage to power the SMPS.
The UC3843B (ICP01) drives the power FET(QP04) according to the PWM signals generated by the R_T and C_T (RP07, CP10) connected pin 4 of ICP01.
The ICP01 is an integrated current mode PWM.
It consists of an oscillator, error amplifier, current sense comparator, under voltage lock-out and an MOSFET drive stage.
The switching frequency is locked to horizontal scan frequency by horizontal flyback pulse.
When the monitor is in Stage2 with no pulsed syncs. QP05 and QP07 is turned off. The total power consumption must be less than 5W in Stage2.

2. DPMS and Self test mode

The power supply supports the DPMS function. Its operation is shown in the table below.

MODE	H-SYNC	V-SYNC	MCU PIN35 (BRI)	MCU PIN 10 (Suspend)	Q905 QP07	14V	HEATER
Stage1	O	O	CONTROL	H	ON	14V	6.3V
Stage2	X	O	0	L	OFF	0V	2V
	O	X					
	X	X					
Self Test	X	X	3.5V	H	ON	14V	6.3V

3. Signal Processing and MCU Control

The X-TAL resonates at 12MHz.
When the H and V sync or TTL composite sync are input to MCU, MCU can measures the H and V frequency to detect the video mode.
MCU has digital to analog converter(DACS) control function like ABL, H-LIN, SBU-SIZE, rotation, brightness. and MCU can control , Recall, H/V-Size, H/V-Position, Pincushion/Trapezoide, Top/Botton-Corner, H/V-Linearity, Parallel/Pin Balance, H/V Moire, Color Control, Information, Language, by I2C BUS Line.
The operation of MCU is shown in the table below.

H-FREQ (kHz)	H-LIN1 PIN 30	H-LIN2 PIN 29	H-LIN3 PIN 28	REMARK
31 < H < 34	L	L	L	
34 < H < 36	L	L	H	
36.0 < H < 41	L	H	H	
41.0 < H < 46	L	H	H	
46 < H < 52	H	L	L	
52 < H < 59	H	L	H	
59< H < 62	H	H	L	
62.0<H<66	H	H	L	
66.0<H<69	H	H	H	

4. Horizontal Deflection

TDA9116is an I2C autosync deflection controller for H / V sync and drive processing.
All functions are controlled by I2C bus.
When H-Sync is applied, the internal oscillator is automatically locked.
The duty-cycle of H-output pulse Pin 26 is variable by frequency.
QH08 and TH01 are used to drive the H-output transistor (QH09). QH09 is turned on, it conducts current through the deflection yoke on the right hand side of the screen.
This current comes from the S correction capacitors (CH27, CH29, CH32, CH34), which have a charge equal to the effective supply voltage.
When the QH09 is opened up, the damper diode(DH12) allows current for left hand side of the screen to flow back through the deflection yoke to the S capacitors.
The flyback capacitor (CH23) determines the size and length of the flyback pulse.
The S capacitors correct outside versus center linearity in horizontal scan.
THREE FETs (QH11, QH12, QH13) select the value of S capacitors.
H-centering is controlled by a switch(SWH01). The switch selects DC offset current flow through the yoke.
A diode modulator is used to control the E-W correction and H-size. ICH01 generates the
E-W parabora wave using vertical amp.
A power buffer (QH02, QH03) drives the diode modulator.
In order to keep the high voltage constant independent of the horizontal scan frequency, the supply voltage of FBT must increase with increasing scan frequency proportionally. A step-up mode DC-DC converter with PWM is used to realize this demand.
ICH01 compares high-voltage feedback with reference voltage. Its output pulse switches a
FET(QH07). To adjust the high voltage, TDA9116(ICH01) has a control terminal (Pin14).

5. Vertical Deflection

In vertical section of TDA9116 there is auto-sync processing.
The vertical output stage consists of a power OP-AMP with extra flyback grnerator.
TDA9302H(ICV01) is used as vertical output stage.

6. X-Ray Protection and Beam Current Limiting.

A failure in the horizontal scan control section could cause a dangerous situation; the high voltage might rise to an unacceptable high level. When the flyback voltage rise to unacceptable level, the (Pin25) of ICH01 detects these states over 8.0V TDA9116
It causes the H-drive stage and oscillator to be turned off. Then high voltage is shut down until the power switch is on.
The average anode current is measured at lower side of the High Voltage winding of the FBT.
ABL flows through Connectors(CNM06,CNC01) connected ICC01(LM1267) and through RM07 Connected ICM01 Pin39. and ABL is controlled by ICM01.

7. Video Amplifier and OSD Interface

LM1267(ICC01) is a Very High Freguncy video amplifier with three matched video amplifiers, OSD Contrast Control SDA, SCL,OSD Interface, OSD BLK drive controls, blanking gate and clamp gate.
H-blank signal is applied to Pin 24. During blanking all three outputs are thrown to the pedestal level. MCU(ICM01)Pin32 Clamp is used to a clamp signal.
The signal is applied to ICC01 Pin 23.
Three OSD inputs (Pin 1,2,3 of ICC01) are TTL compatible and typical bandwidth is 80MHz.
A fast commutate pin is provided to select either the video or the OSD inputs as a source for amplification.
gain of three internal variable gain amplifiers through the I2C bus interface. MTV 021 is designed for monitor application to display built-in characters or fonts on to monitor screen.
The display operation occurs by transferring data and control information from the MCU to RAM through a serial data interface.
The output stage is made of 3-channel power amplifier (LM2467, ICC03). The output is capable of 40 Volts swing in less than 9 nsec?
The three cathodes are AC coupled to the video amplifiers. The DC level on each cathode is set by a cut-off amplifier and clamp diode. The value of the DC voltage is adjusted by DACS.

Visual Characteristics

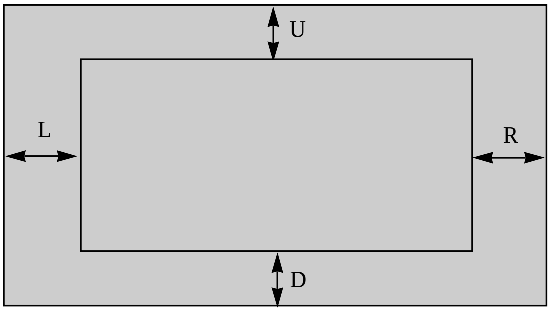
1. Test condition

- Resolution : Any of Preset modes
- Input level : 700mV
- Pattern : Central White box covering 20% of the data area
- Brightness Control : Default position (cut off)
- Contrast Control : Adjust to 100 cd / m2 of luminance (Center of the white field)
- Image duty cycle : 10% to 90%
- Magentic field : Horizontal = 0.3 Gauss
  Vertical = 0.4 Gauss
- Supply Voltage : 100～240 VAC
- Operating Condition
  Temperature (0 to 35)°C
  Humidity (35 to 80)% (W / O condensation)
  Altitude (0 to 3000)m
- Stroage condition
  Temperature (-20 to 60)°C
  Humidity (5 to 85)% (W / O condensation)
  Altitude (0 to 15,000)m

2. Display Centering

The following describes the pattern for this test. Basically it is composed by a single pixel white line around the perimeter of the data area, with marks for the horizontal and vertical axes, the background is black.
The display centering shall be met as following specification at adjustied centering function (user's control)

[L-R] ≤4mm [U-D] ≤4mm

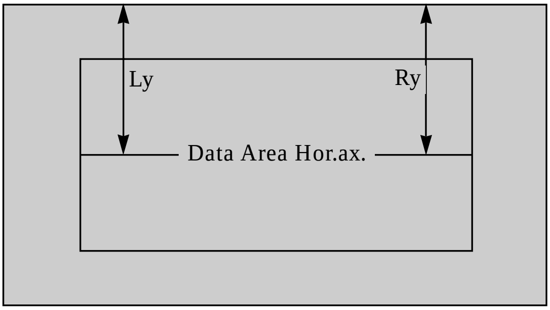


Display Cextering

3. Tilt

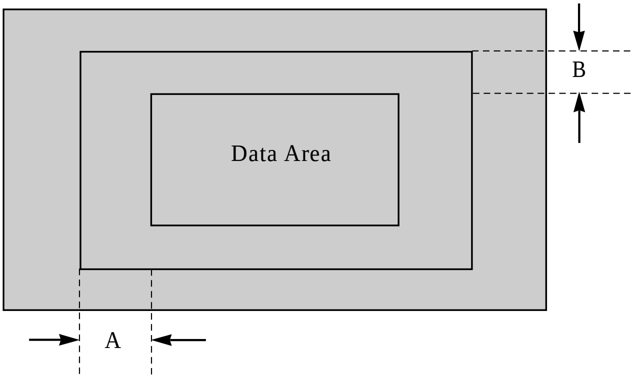
The maximum variation of the display rotation(tilt) shall be with in 2.0mm based on the following formula.

[Ly-Ry] ≤ 2.0mm



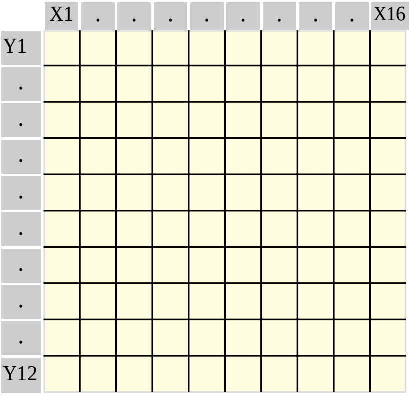
4. Geometric Distortion

All kind of Geometric Distortion
(Pincushion, Barallel, Parallelogram and Trapezoid) shall be with in 2mm boundary (to tolerance frame) Refer to belows tolerance frame.
$A \leq 2mm$ $B \leq 2mm$
The tolerance frame sides are parallel to the window of enclosure axes.



5. Linearity

The linearity of an image displayed on the CRT must meet the following requirements, with reference to figure for both X and Y axis.



- Formula : $\dfrac{XMax-XMin}{XMax+XMin} \times 100 = \leq 6\%$ overall

$$\frac{XMax-XMin}{XMax+XMin} \times 100 = \leq 5\% \text{ adjacent cells}$$

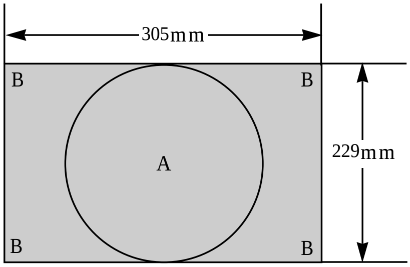
- Where : X1=X2=....X16
  Y1=Y2=....Y12

6. Misconvergence

The display must confirm to all following requirements:
Maximum convergence error.

MODEL	Area	Horiz. Direction	Vert. Direction
Q770	A Central circle field of(299) mm diameter	0.3mm	0.3mm
	B All screen Area (305 ×229) except Area A	0.4mm	0.4mm

The maximum convergence error shall be measures for a white spot of line, and represents the maximum distance between the energy centers of any two primary colors.



Active Area

Power Management System

The automatic power management function saves electricity and reduces heat. Used in conjunction with a PC having Power Management function, or a PC running Screen Blanking software, this monitor automatically reduces its power consumption when the PC is not in use.
This monitor runs in four states:ON(Normal Operating), Stand-by(No Video Signal), Suspend(Minimum Power for Quick Recovery) and OFF(Non-Operating).

This monitor is in complaince with U.S EPA Energy Star and NUTEK requirements.

Please refer to the following specifications.

State	Signals			Power consumption	Recovery time	LED Description
	H-Sync	V-Sync	Video			
Stage1	pulses	pulses	active	70W	-	Green
Stage1	no pulse	pulses	blanked	Less than 5W	within 3 sec	Orange
	pulses	no pulse	blanked			
	no pulse	no pulse	blanked			

☞ (*) ; It is capable to select by user.

Trouble Shooting

1. Introduction

This trouble shooting guide is arranged by fault conditions. Following each fault condition is a check for a signal on condition to be answered YES or NO.
For NO answer proceed to the right and continue until the fault is located.
For a YES answer continue in the left column to the next numbered check.
Again followed this procedure until the fault is located.

2. Trouble shooting procedure

When Troubleshooting this monitor, some precaution should be observed.
Use a high quality isolation tranformer is capable of providing 3 Amps or more.
Never connect primary ground and secondary ground together including use with an isolation transformer.
Measure high voltage with respect to chassing ground only, and with a high impedance prove of 1000 mega-ohm or higher and rated for 30KV DC or higher.
Measure QH09 collector pulse with a high quality 100:1 probe rated for 1500 volts or higher.

3. Troubleshooting procedure

Symptom	Check(YES)	Action(NO)
a) Image is scrolling.	1) Check for Vsync at pin 41 of ICM01	Check 15 pin D-sub connector, cable, ZDM02.
	2) Check for positive going Vsync at pin 2 of ICH01.	Check ICM01, ICH01
	3) Will V-oscillator is locked with input signal? (pin 22 of ICH01)	Check CH01, CH02
	4) Check V-ramp at pin 23 of ICH01.	Replace ICH01.
	5) Check V-out at pin 5 of ICV01.	Check B+ at pin 2,4 of ICV01.
b) Image is unstable.	1) Check for Hsync at pin 40 of ICM01	Check 15 pin D-sub connector, cable, ZDM01.
	2) Check for positive going Hsync at pin 1 of ICH01.	Check ICM01 , ICH01
	3) Will H-oscillator is locked with input signal? (pin 6 of ICH01)	Check CH06, RH06
	4) Check H-out at pin 26 of ICH01	Replace ICH01
	5) Check for flyback pulse at pin 12 of ICH01.	Check RH10

Symptom	Check(YES)	Action(NO)
c) Screen is black but high voltage is present.	1) Check for G2, pin4 of CRT. Around 500 volts?	Check DH28, RH96, RH92, CH53, CRT socket. G2 Wire
	2) Check for heater voltage at pin 6 of CRT. (about 6.3V)	Check DP13, RP24, RP25, QP05 CRT socket. RC32, CNC01
	3) Can screen be lit with brightness control at MAX?	Check DH21, DH25, QH18, QH19. DH26 RH99. CRT socket.
	4) Check for video at pin 5, 6, 7 of ICC01	Check 15 pin D-sub connector, cable, DC4,5,6 Check
	5) Check for positive pulse for clamp at pin 23 of ICC01.	Check ICM01, RC13, CNC01
	6) Check if contrast controls video level at pin 18,19,20 of ICC01.	Check ICM01, ICC01, 5VDC (Pin9)of ICC01
	7) Check for video at pin 1, 2, 3 of ICC03.	Check ICC03, 75VDC (pin 4) 12VDC(pin 8)
	8) Check if R, G, B cut-off control the video DC level at pin 6, 8, 11 of CRT.	Check ICC04
	9) Check CRT.	
d) Screen is black with no high voltage.	1) Is the LED01 lighting in Green color.	Check H.V Sync at pin40, 41 of ICM01. Check pin 8,9 of ICM01. Check ICM01, ICM02,ICC03
	2) Check for 14V at collector of QP07.	Check QP07, QP08. Check pin 10 of ICM01.
	3) Check output pulse at pin 26, 28 of ICH01.	Check for Vcc at pin 29 of ICH01. Check oscilation pulse at pin 6 of ICH01. Check X-Ray voltage below 8.0V at pin 25 of ICH01. Check RH11, RH12, RH13
	4) Check Hor-Drive pulse at Base of QH09.	Check QH08, TH01.
	5) Check B+ at pin 2 of TH04.	Check DH07, LH01, QH07, QH05 QH06, RH41, RH42, RH39, RH16, ICH01
e) No power	1) Check ICP01 pin 4, 7	Check QP01, QP02, DP16, DP07
	2) Check switch pulse at Drain of QP04.	Check pin 6, 3 of ICP01, RP11
	3) Check voltage for, 55V at Cathode of Dp11 and for 7V at Cathode of DP13 and for 14V at cathode of DP15	Recheck above Item(d).

Adjustment Method

1. Caution

Extremely high voltage are present in the area around the FBT(TH04) and the anode high voltage Lead.

2. Equipment Required

Digital Voltmeter
Frequency Counter : about 40 Hz to 100 KHz
Color Analyzer
Video Signal Generator
High Voltmeter : up to 30 KV
Alignment Templete : Attachment 1

3. Before Adjustment

Verify that the video output level is 0.7 Vpp at 75 ohm termination and the video timmings are same as standard timming given in specification. Place the AC power switch to the ON position.
Allow the monitor to stabillize thermally for 15 minutes at least before any adjustment about the image parameters. The electron optics of the CRT and electronics of system require time of stabillize.

4. Adjustment Procedure

4-1 Horizontal raster center setting

- Video Signal : Back Raster pattern in 60kHz, 768 mode
- Measuring Point : SWH01, main board
- Place the Raster in center of the bezel.

4-2 Factory mode setting

- Turn off the power.
- Keep pressing the menu select key until the power turns on.
- Press the menu select key one more time.
- You can see the “F” message in 5the bottom on the right of the OSD main menu.
- This is the factory mode.
- Turn off the power to save the adjusted state.
- Select the "Mode Information" menu after you exit the factory mode.

4-3 Rotation setting

- Video Signal : Cross Hatch pattern in 31.5kHz, 400 mode
- Adjust the rotation of screen by using the menu select key and UP And Down Key.

4-4 Color setting

- Adhere color Analyzer sensor closely to CRT center.
- Set Factory mode.
- Video mode : 68.677kHz, 768 mode

1 Color Temperature 9300°K setting
- Select " 93 " by using the menu select key and up / down KEY.

① Back Raster Setting
- Video signal : Back Raster Pattern
- Adjust the brightness of back raster by Using up / down KEY in “Bright”
- Limits : 2.5 ±0.5 cd / m^2

② Cut-off Setting
- Video signal : Back Raster Pattern
- Select “Cut-off” by using the menu select key and adjustment up / down KEY.
- Press the menu select key to get the desired R, G or B Cut-off.
- Adjust x and y color coord:nate by Using up and down key
- Limits : x=0.283 ±0.01, y=0.297 ±0.01

③ Drive Setting
- Video signal : 20% white box
- Select the "9300" by using the menu select key and R,G or B up / down KEY.
- Press the menu select key to get the desired R or B
- Adjust the x and y color coordinate by Using up and down key
- Limits : x=0.283 ±0.01, y=0.297 ±0.01

④ Contrast Setting
- Video Signal : 20% white box
- Adjust the brightness go to 0.1 cd / m2 by using the adjustment up / down KEY in “Bright”
- Adjust the brightness of 20% white box by using up / down Key in “contrast”
- Limits : 150 ±3 cd / m^2

⑤ Back Raster Setting again
- The method of adjustment is same to section ①

2) Color Temperature 6500°K Setting
- Select " 65 " by using the menu select key and up / down KEY.

① Back Raster, Cut-off Setting
- The method of adjustment is same to 9300°K
- The color coordinate is x=0.313 ±0.01, y=0.329 ±0.01

② Drive, contrast Setting
- The method of adjustment is same to 9300°K
- The color coordinate is x=0.313 ±0.01, y=0.329 ±0.01

4-5 Geometry Setting

- Adhere template closely to the CRT surface
- Video Signal : Cross hatch pattern in 31.5kHz to 69kHz expectively.
- Adjust the all items by using the menu / select key .

1) Horizontal Position Setting
- Place the screen in center of the horizontal direction.

2) Horizontal Size Setting
-Adjust the horizontal size of the screen to 305 ±5 mm
ajust the honitonfal size of the screen to 260 ±4mm.

3) Vertical Position Setting
- ”Place the screen in center of the vertical direction.

4) Vertical Size Setting
- Adjust the vertical size of the screen to 229 ±5 mm

5) Pincushion Setting
- Make the straight line to the vertical right and left line of screen.

6) Trapezoid Setting
- Make the same size to the horizontal up and bottom size of screen.

7) Parallelogram & Pin Balance
- Adjust parallerogram until vertical lines are parallel to the vertical vezel.

8) Corner Pin
- Adjust corner pin until 4 corners are parallel to the vertical vezel.

9) Rotation Setting
- Adjust rotate until horizontal lines are parallel to the vezel.

4-6 Focus

- Video Signal : Reverse " Full H " character pattern in 64kHz 1024 mode
- Adjust H / V Focus VR on the top and middle of the FBT so that the image of whole screen looks clear

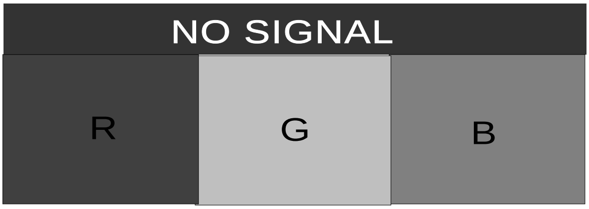
5. X-Ray Protection Test

- In any signal input condition, short RH12 (main board) by using the JIG.
- At this moment, check out whether raster disappears.
- Remove the JIG.
- After the power switch of the set off and on, check out proper working

6. AGING and Self Test Mode

The monitor has an enhanced level of self-diagonostics.
When the signal cable is removed The monitor is operated to self test mode(Following OSD Image) and The Signal Isn't detected, the monitor is operated to OFF-Mode.

Picture A (MODE FOR END USER)



(OSD MESSAGE is moving around the screen)

Specification

CRT	SIZE	17"(16" viewable) Diagonal
	Dot Pitch	0.20 mm (Horizantal Dot Pitch)
	Type	Non-glare, Anti-Static & TCO Coated
Input	Signal	R.G.B Analog
	Cable	15 pin D-Type male Connector
SYNC	H-F	30 kHz～70 kHz(Automatic)
	V-F	50 Hz～150 Hz(Automatic)
Video Bandwidth		108 MHz (-3dB)
Display	Area(H ×V) Color	305×229mm (Max. Over Scan) Infinite
Resolution	Max.	1280×1024(64kHz/60Hz)
User Controls & OSD Controls		Recall, Brightness/Contrast, H/V-Position, H/V-Size, Pincushion/Trapezoid, Rotation, H/V-Moire, Degauss, Color Control, Parallel, Information, Language, OSD H/V Poistion, Pin Balpance, Top/Botton-Corner, H/V-Linearity
Power Management		As per VESA Standard, Lower than EPA's recommendation
VESA DDC 1/2B		Basic
Compatibility		VESA, 8514/A, XGA, EVGA, MAC II
Power Source		100-240 VAC(Universal Power) 70W 1.5A
Safety & Regulation	TCO	Basic
	EMC	FCC Class B, CE,EMC
	Safety	cULus, TÜV-GS, SEMKO, DHHS, PCBC, GOST-R, VCCI
Temperature	Storage	-20 to 60 degree celsius
	Operating	0 to 35 degree celsius
Humidity	Operating	35% to 80% (Non-condensing)
	Storage	5% to 85%
Weight		Unit : 15.5Kg • Gross Weight :17.5Kg(with carton)
Dimension(W ×H ×D mm)		380 ×372 ×411mm

▶Specification is subject to change without notice for performance improvement.

Critical Parts Specification

WT62P1

GENERAL DESCRIPTION

The WT62P1 is a microcontroller for digital controlled monitor with Universal Serial Bus(USB)interface. It contains an 8-bit CPU, 32k bytes flash memory, 512 bytes RAM, 14 PWMs, parallel I/Os, SYNC signal processor, time, DDC 1/2B interface, master/slave I2C interface, low speed USB device module, 6-bit A/D converter and watch-dog timer.

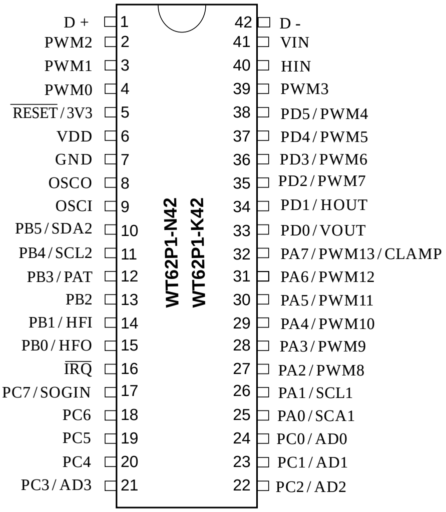
FEATURES

- 8-bit 6502 compatible CPU with 6MHz operating frequency
- 32768 bytes flash memory, 512 bytes SRAM.
- 12 MHz crystal oscillator
- 4 channels processor with H+V separation , H/V frequency counter, H/V polarity detection/control and clamp pulse output
- Sync signal processor with H+V separation, H/V frequency counter, H/V polarity detection/control and clamp pulse output
- Six free-running sync signal outputs(Horizontal frequency up to 106KHz)
- Self-test pattern
- DDC 1/2B supported
- Fast mode master slave I^2C interface(up to 400KHz)
- Embedded USB function with endpoint 0 and endpoint 1
- Built-In 3.3V regulator for USB tranceiver
- Watch-dog timer
- Maximum 28 progammable I/O pins
- One 8-bit programmable timer
- 6-bit A/D converter with 4 selectable inputs
- One external interrupt request input
- Low V_{DD} reset

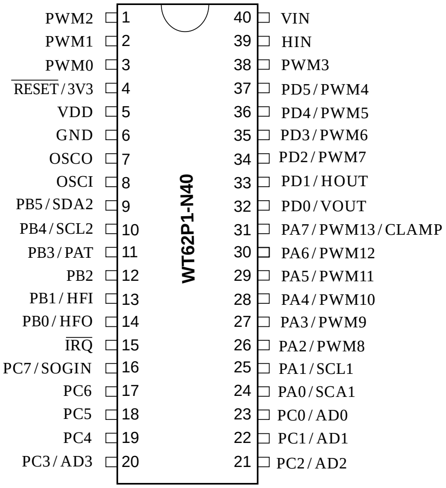
Package Type	Part Number
42-pin PDIP	WT62P1-N42
42-oin shrink PDIP	WT62P1-K42
40-pin PDIP	WT62P1-N40
28-pin skinny PDIP	WT62P1-N28
44--pin SOP	WT62P1-S44

PIN CONFIGURATION

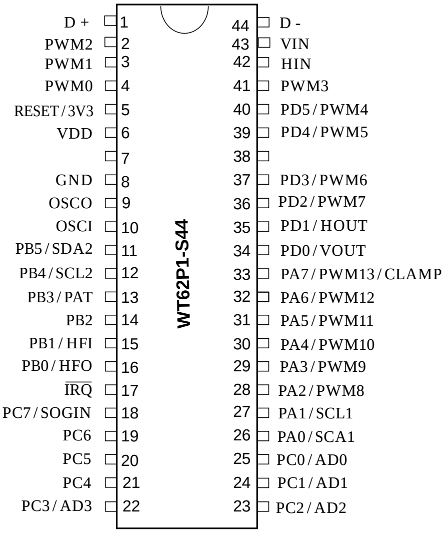
42- Pin PDIP
42- Pin SPDIP


WT62P1-N42
WT62P1-K42
1 D +
2 PWM2
3 PWM1
4 PWM0
5 RESET / 3V3
6 VDD
7 GND
8 OSCO
9 OSCI
10 PB5 / SDA2
11 PB4 / SCL2
12 PB3 / PAT
13 PB2
14 PB1 / HFI
15 PB0 / HFO
16 IRQ
17 PC7 / SOGIN
18 PC6
19 PC5
20 PC4
21 PC3 / AD3
22 PC2 / AD2
23 PC1 / AD1
24 PC0 / AD0
25 PA0 / SCA1
26 PA1 / SCL1
27 PA2 / PWM8
28 PA3 / PWM9
29 PA4 / PWM10
30 PA5 / PWM11
31 PA6 / PWM12
32 PA7 / PWM13 / CLAMP
33 PD0 / VOUT
34 PD1 / HOUT
35 PD2 / PWM7
36 PD3 / PWM6
37 PD4 / PWM5
38 PD5 / PWM4
39 PWM3
40 HIN
41 VIN
42 D -

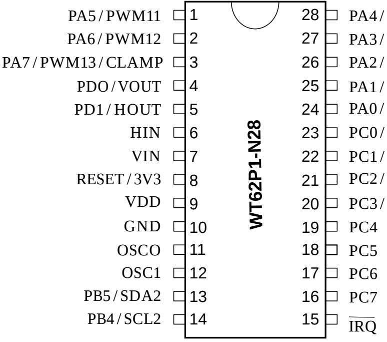
40- Pin PDIP


WT62P1-N40
1 PWM2
2 PWM1
3 PWM0
4 RESET / 3V3
5 VDD
6 GND
7 OSCO
8 OSCI
9 PB5 / SDA2
10 PB4 / SCL2
11 PB3 / PAT
12 PB2
13 PB1 / HFI
14 PB0 / HFO
15 IRQ
16 PC7 / SOGIN
17 PC6
18 PC5
19 PC4
20 PC3 / AD3
21 PC2 / AD2
22 PC1 / AD1
23 PC0 / AD0
24 PA0 / SCA1
25 PA1 / SCL1
26 PA2 / PWM8
27 PA3 / PWM9
28 PA4 / PWM10
29 PA5 / PWM11
30 PA6 / PWM12
31 PA7 / PWM13 / CLAMP
32 PD0 / VOUT
33 PD1 / HOUT
34 PD2 / PWM7
35 PD3 / PWM6
36 PD4 / PWM5
37 PD5 / PWM4
38 PWM3
39 HIN
40 VIN

44 - Pin SOP


WT62P1-S44
1 D +
2 PWM2
3 PWM1
4 PWM0
5 RESET / 3V3
6 VDD
7
8 GND
9 OSCO
10 OSCI
11 PB5 / SDA2
12 PB4 / SCL2
13 PB3 / PAT
14 PB2
15 PB1 / HFI
16 PB0 / HFO
17 IRQ
18 PC7 / SOGIN
19 PC6
20 PC5
21 PC4
22 PC3 / AD3
23 PC2 / AD2
24 PC1 / AD1
25 PC0 / AD0
26 PA0 / SCA1
27 PA1 / SCL1
28 PA2 / PWM8
29 PA3 / PWM9
30 PA4 / PWM10
31 PA5 / PWM11
32 PA6 / PWM12
33 PA7 / PWM13 / CLAMP
34 PD0 / VOUT
35 PD1 / HOUT
36 PD2 / PWM7
37 PD3 / PWM6
38
39 PD4 / PWM5
40 PD5 / PWM4
41 PWM3
42 HIN
43 VIN
44 D -

28-Pin skinny PDIP


WT62P1-N28
1 PA5 / PWM11
2 PA6 / PWM12
3 PA7 / PWM13 / CLAMP
4 PDO / VOUT
5 PD1 / HOUT
6 HIN
7 VIN
8 RESET / 3V3
9 VDD
10 GND
11 OSCO
12 OSC1
13 PB5 / SDA2
14 PB4 / SCL2
15 IRQ
16 PC7
17 PC6
18 PC5
19 PC4
20 PC3 / AD3
21 PC2 / AD2
22 PC1 / AD1
23 PC0 / AD0
24 PA0 / SDA1
25 PA1 / SCL1
26 PA2 / PWM8
27 PA3 / PWM9
28 PA4 / PWM10

TDA9116

FEATURES

General

- ADVANCED I²C BUS CONTROLLED DEFLECTION PROCESSOR DEDICATED FOR HIGH-END CRT MONITORS
- SINGLE SUPPLY VOLTAGE 12V
- VERY LOW JITTER
- DC/DC CONVERTER CONTROLLER
- ADVANCED EW DRIVE
- ADVANCED ASYMMETRY CORRECTIONS
- AUTOMATIC MULTISTANDARD SYNCHRONIZATION
- VERTICAL DYNAMIC CORRECTION WAVEFORM OUTPUT
- X-RAY PROTECTION AND SOFT-START & STOP ON HORIZONTAL AND DC/DC DRIVE OUTPUTS
- I²C BUS STATUS REGISTER

Horizontal section

- 150 kHz maximum frequency
- Corrections of geometric asymmetry: Pin cushion asymmetry, Parallelogram
- Tracking of asymmetry corrections with vertical size and position

  Fully integrated internal horizontal moiré cancellation and moiré cancellation output

Vertical section

- 200 Hz maximum frequency
- Vertical ramp for DC-coupled output stage with adjustments of: C-correction, S-correction for super-flat CRT, Vertical size, Vertical position
- Vertical moiré cancellation through vertical ramp waveform

  Compensation of vertical breathing with EHT variation

EW section

- Symmetrical geometry corrections: Pin cushion, Keystone, Top/Bottom corners separately

  Horizontal size adjustment
- Tracking of EW waveform with Vertical size and position and adaptation to frequency
- Compensation of horizontal breathing through EW waveform

Dynamic correction section

- Output with vertical dynamic correction waveform for dynamic corrections like focus, brightness uniformity, ...
- Fixed on screen by means of tracking system

DC/DC controller section

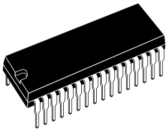
- Step-up and step-down conversion modes
- External sawtooth configuration
- Bus-controlled output voltage
- Synchronization on hor. frequency with phase selection
- Selectable polarity of drive signal

DESCRIPTION

The TDA9116 is a monolithic integrated circuit assembled in a 32-pin shrink dual-in-line plastic package. This IC controls all the functions related to horizontal and vertical deflection in multimode or multi-frequency computer display monitors.

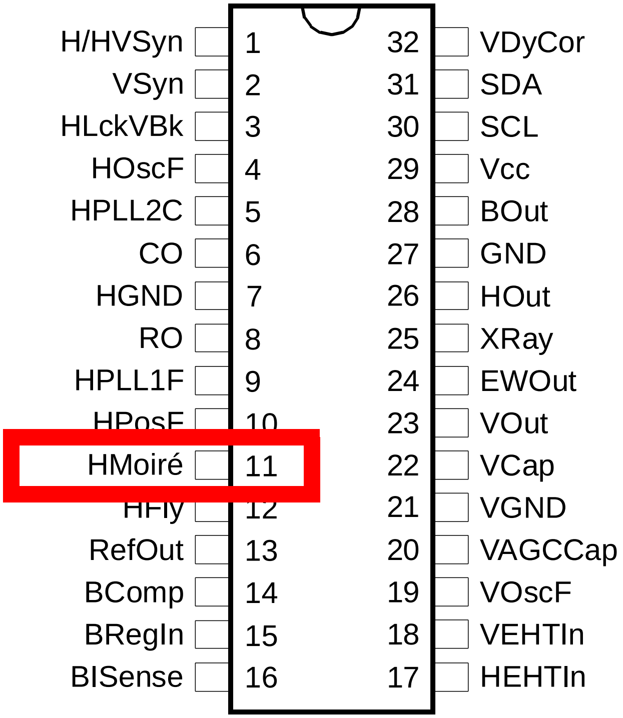
The internal sync processor, combined with the powerful geometry correction block, makes the TDA9116 suitable for very high performance monitors, using few external components.

Combined with other ST components dedicated for CRT monitors (microcontroller, video preamplifier, video amplifier, OSD controller) the TDA9116 allows fully I²C bus-controlled computer display monitors to be built with a reduced number of external components.

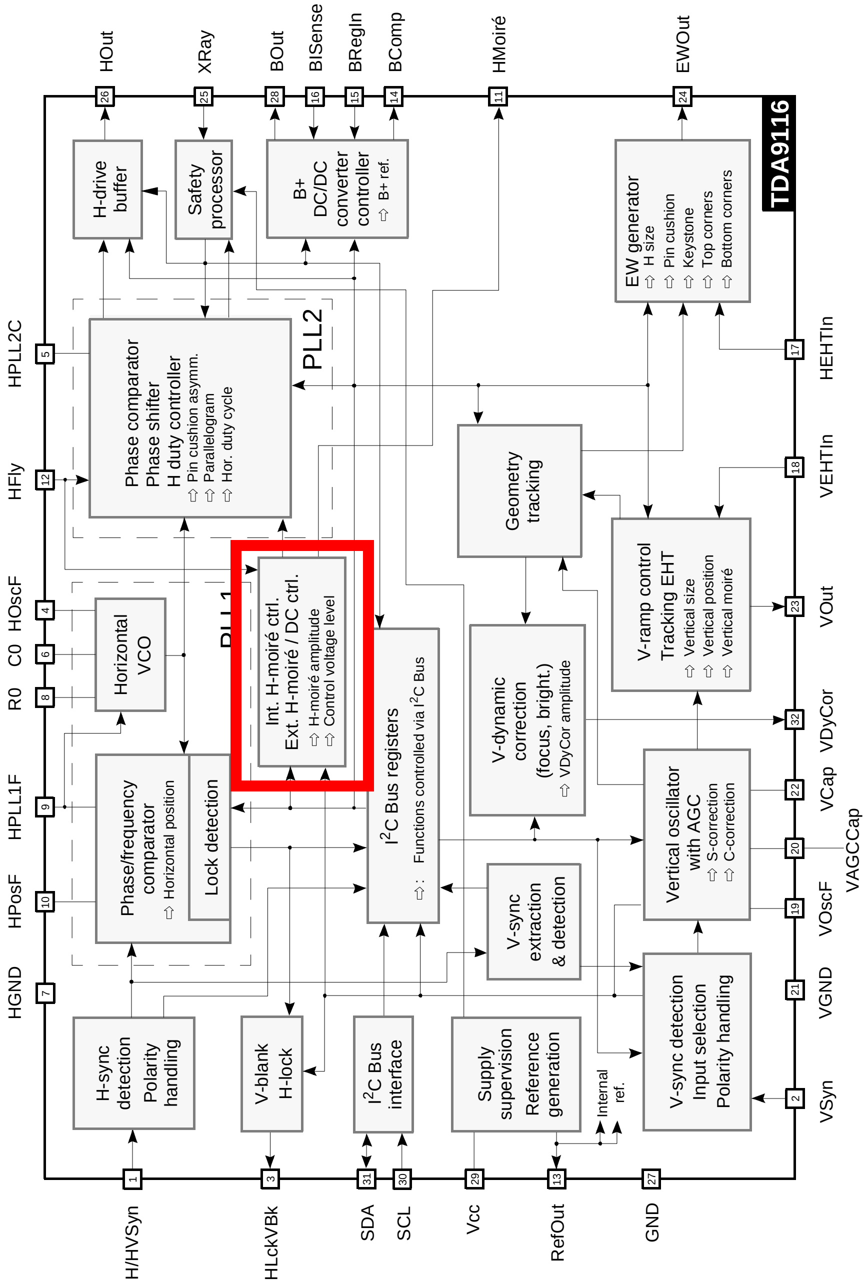


SHRINK 32 (Plastic Package)
ORDER CODE: TDA9116

2 - PIN CONFIGURATION


H/HVSyn 1
VSyn 2
HLckVBk 3
HOscF 4
HPLL2C 5
CO 6
HGND 7
RO 8
HPLL1F 9
HPosF 10
HMoiré 11
HFly 12
RefOut 13
BComp 14
BRegIn 15
BISense 16
32 VDyCor
31 SDA
30 SCL
29 Vcc
28 BOut
27 GND
26 HOut
25 XRay
24 EWOut
23 VOut
22 VCap
21 VGND
20 VAGCCap
19 VOscF
18 VEHTIn
17 HEHTIn

3 - BLOCK DIAGRAM


TDA9116
HOut 26
XRay 25
BOut 28
BISense 16
BRegIn 15
BComp 14
HMoiré 11
EWOut 24
HPLL2C 5
HFly 12
HOscF 4
C0 6
R0 8
HPLL1F 9
HPosF 10
HGND 7
HEHTIn 17
VEHTIn 18
VOut 23
VDyCor 32
VCap 22
VAGCCap 20
VOscF 19
VGND 21
VSyn 2
H/HVSyn 1
HLckVBk 3
SDA 31
SCL 30
Vcc 29
RefOut 13
GND 27
H-drive buffer
Safety processor
B+ DC/DC converter controller
⇧ B+ ref.
EW generator
⇧ H size
⇧ Pin cushion
⇧ Keystone
⇧ Top corners
⇧ Bottom corners
Phase comparator
Phase shifter
H duty controller
⇧ Pin cushion asymm.
⇧ Parallelogram
⇧ Hor. duty cycle
PLL2
Geometry tracking
V-ramp control
Tracking EHT
⇧ Vertical size
⇧ Vertical position
⇧ Vertical moiré
Horizontal VCO
PLL1
Int. H-moiré ctrl.
Ext. H-moiré / DC ctrl.
⇧ H-moiré amplitude
⇧ Control voltage level
I²C Bus registers
⇧ : Functions controlled via I²C Bus
V-dynamic correction (focus, bright.)
⇧ VDyCor amplitude
Phase/frequency comparator
⇧ Horizontal position
Lock detection
Vertical oscillator with AGC
⇧ S-correction
⇧ C-correction
V-sync extraction & detection
H-sync detection
Polarity handling
V-blank
H-lock
I²C Bus interface
Supply supervision
Reference generation
Internal ref.
V-sync detection
Input selection
Polarity handling

4 - PIN FUNCTION REFERENCE

Pin	Name	Function
1	H/HVSyn	TTL compatible **H**orizontal **/ H**orizontal and **V**ertical **Syn**c. input
2	VSyn	TTL compatible **V**ertical **Syn**c. input
3	HLckVBk	**H**orizontal PLL1 **L**o**ck** detection and **V**ertical early **B**lan**k**ing composite output
4	HOscF	High **H**orizontal **Osc**illator sawtooth threshold level **F**ilter input
5	HPLL2C	**H**orizontal **PLL2** loop **C**apacitive filter input
6	CO	Horizontal **O**scillator **C**apacitor input
7	HGND	**H**orizontal section **G**rou**ND**
8	RO	Horizontal **O**scillator **R**esistor input
9	HPLL1F	**H**orizontal **PLL1** loop **F**ilter input
10	HPosF	**H**orizontal **Pos**ition **F**ilter and soft-start time constant capacitor input
11	HMoiré	**H**orizontal **M**oiré / adjustable DC voltage output
12	HFly	**H**orizontal **Fly**back input
13	RefOut	**Ref**erence voltage **Out**put
14	BComp	**B**+ DC/DC error amplifier (**Comp**arator) output
15	BRegIn	**Reg**ulation feedback **In**put of the **B**+ DC/DC converter controller
16	BISense	**B**+ DC/DC converter current (**I**) **Sense** input
17	HEHTIn	**In**put for compensation of **H**orizontal amplitude versus **EHT** variation
18	VEHTIn	**In**put for compensation of **V**ertical amplitude versus **EHT** variation
19	VOscF	**V**ertical **Osc**illator sawtooth low threshold **F**ilter (capacitor to be connected to VGND)
20	VAGCCap	Input for storage **Cap**acitor for **A**utomatic **G**ain **C**ontrol loop in **V**ertical oscillator
21	VGND	**V**ertical section **G**rou**ND**
22	VCap	**V**ertical sawtooth generator **Cap**acitor
23	VOut	**V**ertical deflection drive **Out**put for a DC-coupled output stage
24	EWOut	**E/W Out**put
25	XRay	**X**-**Ray** protection input
26	HOut	**H**orizontal drive **Out**put
27	GND	Main **G**rou**ND**
28	BOut	**B**+ DC/DC converter controller **Out**put
29	Vcc	Supply voltage
30	SCL	I^2C bus **S**erial **CL**ock Input
31	SDA	I^2C bus **S**erial **DA**ta input/output
32	VDyCor	**V**ertical **Dy**namic **Cor**rection output

5 - QUICK REFERENCE DATA

Characteristic	Value	Unit
General		
Package	SDIP 32	
Supply voltage	12	V
Supply current	65	mA
Application category	Mid-range	
Means of control/Maximum clock frequency	I^{2}C bus/400	kHz
EW drive	Yes	
DC/DC converter controller	Yes	
Adjustable DC level output	Yes	
Horizontal section		
Frequency range	15 to 150	kHz
Autosync frequency ratio (can be enlarged in application)	4.5	
Positive/Negative polarity of horizontal sync signal/Automatic adaptation	Yes/Yes/Yes	
Duty cycle range of the drive signal	30 to 65	%
Position adjustment range with respect to H period	±10	%
Soft start/Soft stop feature	Yes/Yes	
Hardware/Software PLL lock indication	Yes/Yes	
Parallelogram	Yes	
Pin cushion asymmetry correction (also called Side pin balance)	Yes	
Top/Bottom/Common corner asymmetry correction	No/No/No	
Tracking of asymmetry corrections with vertical size & position	Yes	
Horizontal moiré cancellation (int./ext.) for Combined/Separated architecture	Yes/Yes	
Vertical section		
Frequency range	35 to 200	Hz
Autosync frequency range (150nF at VCap and 470nF at VAGCCap)	50 to 180	Hz
Positive/Negative polarity of vertical sync signa/Automatic adaptationl	Yes/Yes/Yes	
S-correction/C-correction/Super-flat tube characteristic	Yes/Yes/Yes	
Vertical size/Vertical position adjustment	Yes/Yes	
Vertical moiré cancellation (internal)	Yes	
Vertical breathing compensation	Yes	
EW section		
Pin cushion correction	Yes	
Keystone correction	Yes	
Top/Bottom/Common corner correction	Yes/Yes/No	
Horizontal size adjustment	Yes	
Tracking of EW waveform with Frequency/Vertical size & position	Yes/Yes	
Breathing compensation on EW waveform	Yes	
Dynamic correction section (dyn. focus, dyn. brightness,...)		
Vertical dynamic correction output	Yes	
Horizontal dynamic correction output	No	
Composite HV dynamic correction output	No	
Tracking of vertical waveform with V. size & position	Yes	
DC/DC controller section		
Step-up/Step-down conversion mode	Yes/Yes	
Internal/External sawtooth configuration	No/Yes	
Bus-controlled output voltage	Yes	
Soft start/Soft stop feature	Yes/Yes	
Positive(N-MOS)/Negative(P-MOS) polarity of BOut signal	Yes/Yes	

LM2467

Monolithic Triple 7.5 ns CRT Driver

General Description

The LM2467 is an integrated high voltage CRT driver circuit designed for use in color monitor applications. The IC contains three high input impedance, wide band amplifiers which directly drive the RGB cathodes of a CRT. Each channel has its gain internally set to ˛20 and can drive CRT capacitive loads as well as resistive loads present in other applications, limited only by the package's power dissipation.

The IC is packaged in an industry standard 9-lead TO-220 molded plastic power package. See Thermal Considerations section.

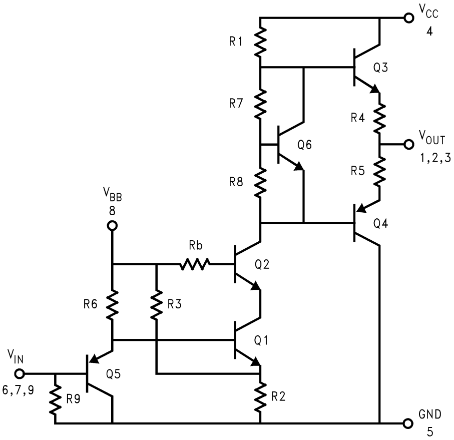
Features

- Higher gain to match LM126X CMOS preamplifiers
- 0V to 3.75V input range
- Stable with 0±20 pF capacitive loads and inductive peaking networks
- Convenient TO-220 staggered lead package style
- Maintains standard LM243X Family pinout which is designed for easy PCB layout

Applications

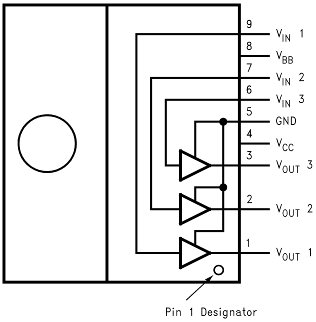
- 024 x 768 displays up to 85 Hz refresh
- Pixel clock frequencies up to 95 MHz
- Monitors using video blanking

Schematic and Connection Diagrams


V_CC
4
R1
Q3
R7
R4
V_OUT
1,2,3
Q6
R8
R5
Q4
V_BB
8
Rb
Q2
R6
R3
Q1
V_IN
Q5
6,7,9
R9
R2
GND
5

DS200078-1

FIGURE 1. Simplified Schematic Diagram (One Channel)


9
V_IN 1
8
V_BB
7
V_IN 2
6
V_IN 3
5
GND
4
V_CC
3
V_OUT 3
2
V_OUT 2
1
V_OUT 1
Pin 1 Designator

DS200078-2

Note: Tab is at GND

Top View
Order Number LM2467T

Absolute Maximum Ratings (Notes 1, 3)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage (V_{CC})	+90V
Bias Voltage (V_{BB})	+16V
Input Voltage (V_{IN})	0V to 4.5V
Storage Temperature Range (T_{STG})	−65 C to +150 C
Lead Temperature	
(Soldering, < 10 sec.)	300 C
ESD Tolerance, Human Body Model	2 kV
Machine Model	250V

Operating Ranges (Note 2)

V_{CC}	+60V to +85V
V_{BB}	+8V to +15V
V_{IN}	+0V to +3.75V
V_{OUT}	+15V to +75V
Case Temperature	−20 C to +100 C

Do not operate the part without a heat sink.

Electrical Characteristics

(See *Figure 2* for Test Circuit)
Unless otherwise noted: V_{CC} = +80V, V_{BB} = +12V, C_L = 8 pF, T_C = 50 C
DC Tests: V_{IN} = 2.25VDC
AC Tests: Output = 40V_{PP}(25V - 65V) at 1MHz

Symbol	**Parameter**	**Conditions**	**LM2467**			**Units**
			Min	**Typical**	**Max**	
I_{CC}	Supply Current	All Three Channels, No Input Signal, No Output Load		30		mA
I_{BB}	Bias Current	All Three Channels		18		mA
V_{OUT}	DC Output Voltage	No AC Input Signal, V_{IN} = 1.25V	62	65	68	V_{DC}
A_V	DC Voltage Gain	No AC Input Signal	18	20	22	
ΔA_V	Gain Matching	(Note 4), No AC Input Signal		1.0		dB
LE	Linearity Error	(Notes 4, 5), No AC Input Signal		5		%
t_R	Rise Time	(Note 6), 10% to 90%		7.5		ns
t_F	Fall Time	(Note 6), 90% to 10%		8		ns
OS	Overshoot	(Note 6)		5		%

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.

Note 2: Operating ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may change when the device is not operated under the listed test conditions.

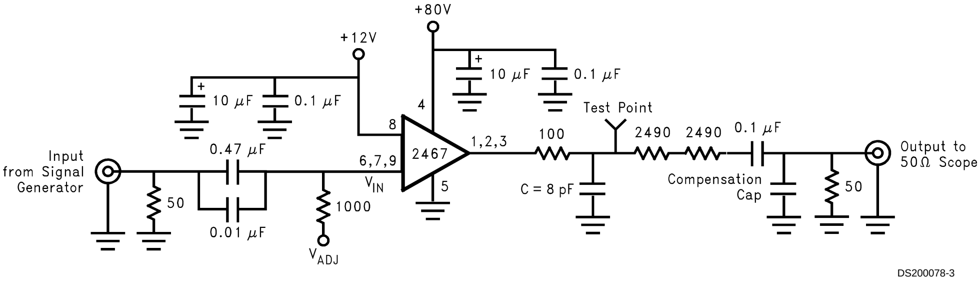
Note 3: All voltages are measured with respect to GND, unless otherwise specified.

Note 4: Calculated value from Voltage Gain test on each channel.

Note 5: Linearity Error is the variation in dc gain from V_{IN} = 1.0V to V_{IN} = 3.5V.

Note 6: Input from signal generator: t_r, t_f < 1 ns.

AC Test Circuit

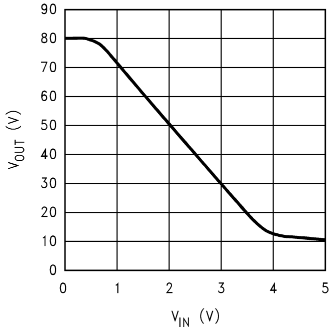

+80V
+12V
+
10 µF
0.1 µF
+
10 µF
0.1 µF
4
8
Test Point
Input
from Signal
Generator
0.47 µF
6,7,9
2467
1,2,3
100
2490
2490
0.1 µF
Output to
50Ω Scope
VIN
5
C = 8 pF
Compensation
Cap
50
50
1000
0.01 µF
VADJ
DS200078-3

Note: 8 pF load includes parasitic capacitance.

FIGURE 2. Test Circuit (One Channel)

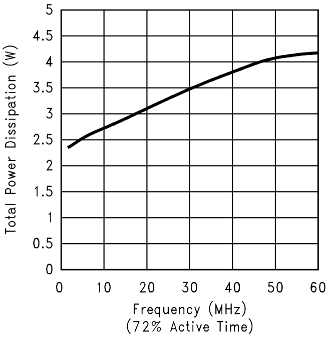
Figure 2 shows a typical test circuit for evaluation of the LM2467. This circuit is designed to allow testing of the LM2467 in a 50Ω environment without the use of an expensive FET probe. The two 2490Ω resistors form a 200:1 divider with the 50Ω resistor and the oscilloscope. A test point is included for easy use of an oscilloscope probe.The compensation capacitor is used to compensate the stray capacitance of the two 2490Ω resistors to achieve flat frequency response.

Typical Performance Characteristics (V_{CC} = +80 V_{DC}, V_{BB} = +12 V_{DC}, C_L = 8 pF, V_{OUT} = 40 V_{PP} (25V¸65V), Test Circuit - *Figure 2* unless otherwise specified)



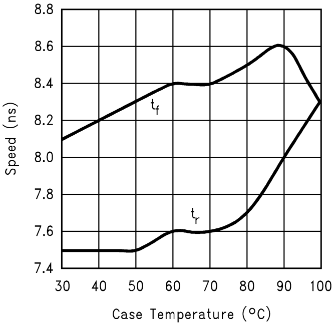
DS200078-4

FIGURE 3. V_{OUT} vs V_{IN}



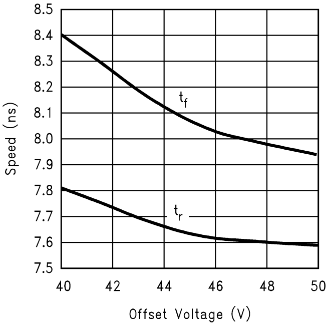
DS200078-7

FIGURE 6. Power Dissipation vs Frequency



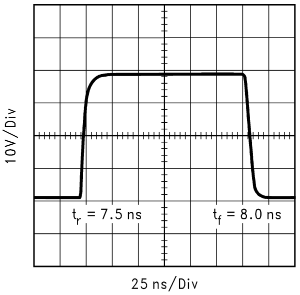
DS200078-5

FIGURE 4. Speed vs Temp.



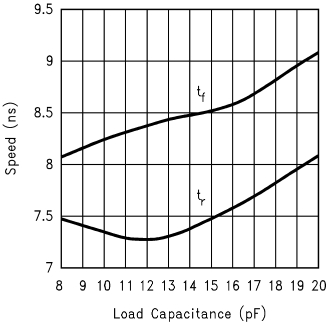
DS200078-8

FIGURE 7. Speed vs Offset



DS200078-6

FIGURE 5. LM2467 Pulse Response



DS200078-9

FIGURE 8. Speed vs Load Capacitance

LM2479

120V Triple Bias Clamp

General Description

The LM2479 is an Integrated 120V triple bias clamp circuit for DC recovery of each of the AC coupled outputs of a CRT driver. It is well matched with the DAC outputs of the LM126X family of pre-amplifiers. Each amplifier has its gain internally set to -18. The IC is packaged in an industry standard 8 lead molded DIP package.

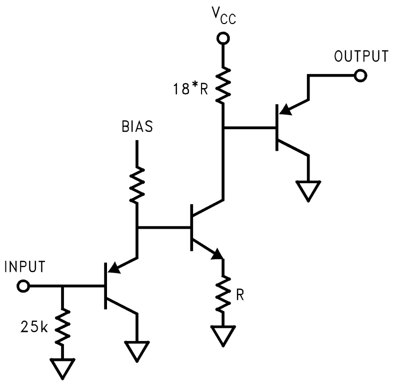
Features

- Wide range integrated triple bias clamp
- High input impedance
- Single supply operation
- Matched to the LM126X family of preamplifiers

Recommended Applications

- CRT monitors requiring DC restoration at the cathodes

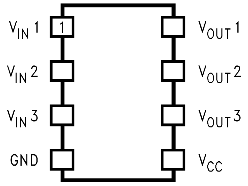
Block Diagrams



DS101391-1

FIGURE 1. Simplified Schematic (One Channel)

Package Pinout



DS101391-2

FIGURE 2. LM2479 Package Pinout
Order Number LM2479NA
NS Package Number: N08E

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage, V_{CC}	+130V
Input Voltage, V_{IN}	0V to 5V
Storage Temperature Range, T_{STG}	-65 C to +150 C
Lead Temperature (Soldering, <10sec.)	300 C
ESD Tolerance, Machine Model	200V

Limits of Operating Ranges (Note 3)

V_{CC}	110 to 125
V_{OUT}, V_{CC} = 120V	50 to 120V
Ambient Temperature Range, T_A	0 to 70 C

DC CLAMP ELECTRICAL CHARACTERISTICS TARGETS AND LIMIT

Unless otherwise noted: V_{CC} = +120V, V_{IN} = 2.25V_{DC}, T_A = 25 C.

Symbol	Spec Parameter	Conditions	Min	Typ	Max	Units
I_{CC}	Supply Current	All channels		2.3	3.5	mA
V_{OUT}	DC Output Voltage		83	87	91	V_{DC}
$V_{OUT\text{-}Range}$	Output Voltage Range	V_{IN} Range = 1.0V - 4.0V		53		V
A_V	DC Voltage Gain		-16	-18	-20	
LE	Linearity Error	See Note 1		5		%
R_{IN}	Input Resistance			24K		Ω

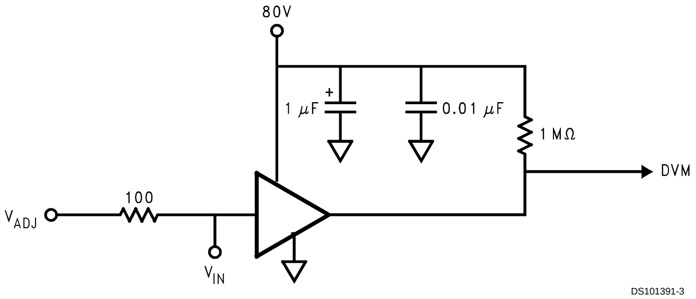
Note 1: Linearity Error is the variation in DC gain from V_{IN} = 1.0V to V_{IN} = 4.0V.

Note 2: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.

Note 3: Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. For guaranteed specifications and the test conditions, see the Electrical Characteristics. The guaranteed specifications apply only for the test conditions listed. Some performance characteristics may change when the device is not operated under the listed test conditions.

Note 4: All voltages are measured with respect to GND, unless otherwise specified.

Test Circuit



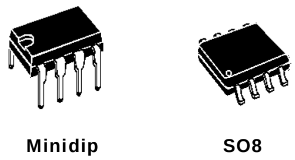
DS101391-3

FIGURE 3. Test Circuit (One Channel)

Figure 3 shows the test circuit for evaluation of the LM2479 Clamp Amplifier. A high impedance VM (>100MΩ) is used for DC measurements at the output.

UC3843B

- TRIMMED OSCILLATOR FOR PRECISE FREQUENCY CONTROL
- OSCILLATOR FREQUENCY GUARANTEED AT 250kHz
- CURRENT MODE OPERATION TO 500kHz
- AUTOMATIC FEED FORWARD COMPENSATION
- LATCHING PWM FOR CYCLE-BY-CYCLE CURRENT LIMITING
- INTERNALLY TRIMMED REFERENCE WITH UNDERVOLTAGE LOCKOUT
- HIGH CURRENT TOTEM POLE OUTPUT
- UNDERVOLTAGE LOCKOUT WITH HYSTERESIS
- LOW START-UP AND OPERATING CURRENT

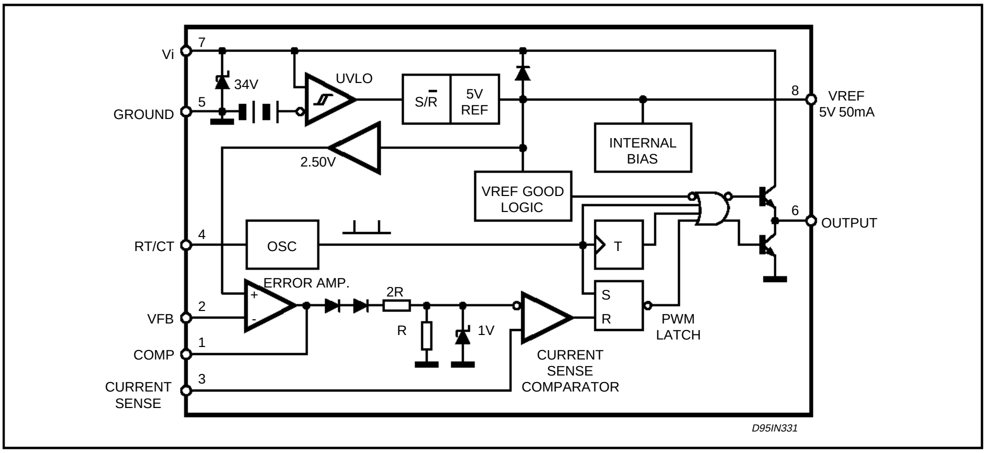

Minidip
SO8

DESCRIPTION

The UC384xB family of control ICs provides the necessary features to implement off-line or DC to DC fixed frequency current mode control schemes with a minimal external parts count. Internally implemented circuits include a trimmed oscillator for precise DUTY CYCLE CONTROL under voltage lockout featuring start-up current less than 0.5mA, a precision reference trimmed for accuracy at the error amp input, logic to insure latched operation, a PWM comparator which also provides current limit control, and a totem pole output stage designed to source or sink high peak current. The output stage, suitable for driving N-Channel MOSFETs, is low in the off-state.

Differences between members of this family are the under-voltage lockout thresholds and maximum duty cycle ranges. The UC3842B and UC3844B have UVLO thresholds of 16V (on) and 10V (off), ideally suited off-line applications The corresponding thresholds for the UC3843B and UC3845B are 8.5 V and 7.9 V. The UC3842B and UC3843B can operate to duty cycles approaching 100%. A range of the zero to < 50 % is obtained by the UC3844B and UC3845B by the addition of an internal toggle flip flop which blanks the output off every other clock cycle.

BLOCK DIAGRAM


Vi
7
34V
UVLO
S/R
5V
REF
8
VREF
5V 50mA
GROUND
5
2.50V
INTERNAL
BIAS
VREF GOOD
LOGIC
6
OUTPUT
RT/CT
4
OSC
T
ERROR AMP.
+
-
2R
R
1V
VFB
2
S
R
PWM
LATCH
COMP
1
CURRENT
SENSE
3
CURRENT
SENSE
COMPARATOR
D95IN331

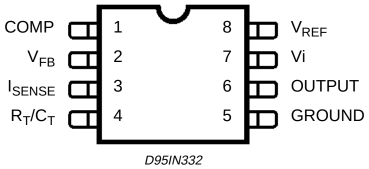
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_i	Supply Voltage (low impedance source)	30	V
V_i	Supply Voltage (Ii < 30mA)	Self Limiting	
I_O	Output Current	+1	A
E_O	Output Energy (capacitive load)	5	µJ
	Analog Inputs (pins 2, 3)	± 0.3 to 5.5	V
	Error Amplifier Output Sink Current	10	mA
P_{tot}	Power Dissipation at T_{amb} 3 25 5C (Minidip)	1.25	W
P_{tot}	Power Dissipation at Tamb 3 25 5C (SO8)	800	mW
T_{stg}	Storage Temperature Range	± 65 to 150	5C
T_J	Junction Operating Temperature	± 40 to 150	5C
T_L	Lead Temperature (soldering 10s)	300	5C

* All voltages are with respect to pin 5, all currents are positive into the specified terminal.

PIN CONNECTION (top view)

Minidip/SO8



PIN FUNCTIONS

No	Function	Description
1	COMP	This pin is the Error Amplifier output and is made available for loop compensation.
2	V_{FB}	This is the inverting input of the Error Amplifier. It is normally connected to the switching power supply output through a resistor divider.
3	I_{SENSE}	A voltage proportional to inductor current is connected to this input. The PWM uses this information to terminate the output switch conduction.
4	R_T/C_T	The oscillator frequency and maximum Output duty cycle are programmed by connecting resistor R_T to Vref and cpacitor C_T to ground. Operation to 500kHz is possible.
5	GROUND	This pin is the combined control circuitry and power ground.
6	OUTPUT	This output directly drives the gate of a power MOSFET. Peak currents up to 1A are sourced and sunk by this pin.
7	V_{CC}	This pin is the positive supply of the control IC.
8	V_{ref}	This is the reference output. It provides charging current for capacitor C_T through resistor R_T.

ORDERING NUMBERS

SO8	Minidip
UC2842BD1; UC3842BD1 UC2843BD1; UC3843BD1 UC2844BD1; UC3844BD1 UC2845BD1; UC3845BD1	UC2842BN; UC3842BN UC2843BN; UC3843BN UC2844BN; UC3844BN UC2845BN; UC3845BN

KS24C08

4K 2.5V CMOS Serial EEPROMs

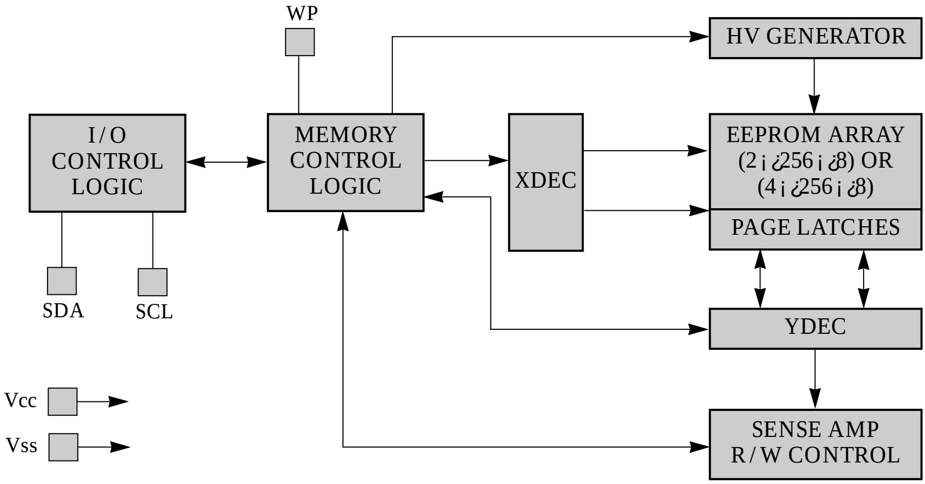
FEATURES

- Single supply with operation down to 2.5V
- Low power CMOS technology
  - 1 mA active current typical
  - 10μA standby current typical at 5.5V
  - 5 μA standby current typical at 3.0V
- Organized as two or fore blocks of 256 bytes (2 × 256 × 8) and (4 × 256 × 8)
- Two wire serial interface bus, 12CTM
- Schmitt tigger, filtered inputs for noise suppression
- Output slope control to eliminate ground bounce
- 100kHz (2.5V) and 400kHz (5V) compatibility
- Self-timed write cycle (including auto-erase)
- Page-write buffer for up to 16 bytes
- 2 ms typical write cycle time for page-write
- Hardware write cycle time for page-write
- Can be operated as a serial ROM
- Factory programming (OTP) available
- ESD protection > 4,000V
- 1,000,000 ERASE / WRITE cycles (typical)
- Data retention > 40 years
- 8-pin DIP, 8-lead or 14-lead SOIC packages
- Available for extended temperature ranges
  - Commercial : 0°C to +70°C
  - Industrial : -40°C to +85°C

DESCRIPTION

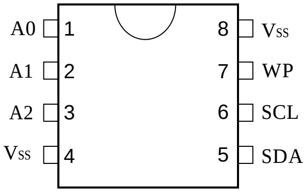
The Microchip Technology Inc. 24LC04B/08B is a 4K-or 8K-bit Electrically Erasable PROM. The device is organized as two or four blocks of 256¡¿8 bit memory with a two wire serial interface. Low voltage design permits operation down to 2.5 volts with standby and active currents of obly 5μA and 1mA respectively.
The 24LC04B/08B also has a page-write capability for up to 16 bytes of data. The 24LC04B/08B is available in the standard 8-pin DIP and both 8-lead and 14-lead surface mount SOIC packages.

BLOCK DIAGRAM

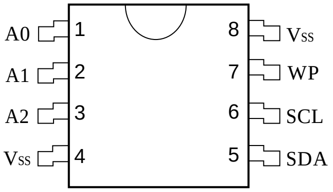

WP
HV GENERATOR
I/O CONTROL LOGIC
MEMORY CONTROL LOGIC
XDEC
EEPROM ARRAY (2¡¿256¡¿8) OR (4¡¿256¡¿8)
PAGE LATCHES
SDA
SCL
YDEC
Vcc
Vss
SENSE AMP R/W CONTROL

PIN CONFIGURATION

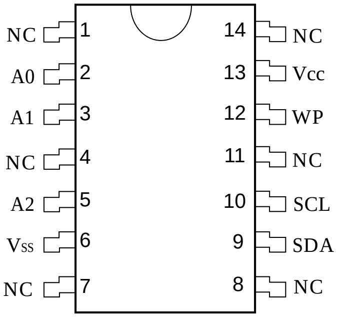
DIP Package


A0 1
A1 2
A2 3
Vss 4
8 Vss
7 WP
6 SCL
5 SDA

8-SOIC Package


A0 1
A1 2
A2 3
Vss 4
8 Vss
7 WP
6 SCL
5 SDA

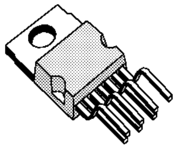
14-SOIC Package


NC 1
A0 2
A1 3
NC 4
A2 5
Vss 6
NC 7
14 NC
13 Vcc
12 WP
11 NC
10 SCL
9 SDA
8 NC

PC is a trademark of Philips Corporation

TDA9302H

- POWER AMPLIFIER
- FLYBACK GENERATOR
- THERMAL PROTECTION



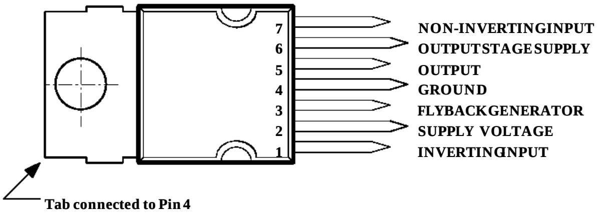
HEPTAWATT
(Plastic Package)

ORDER CODE : TDA9302H

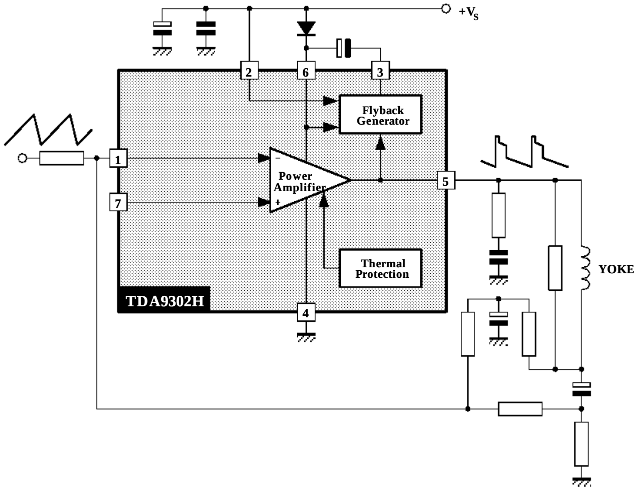
DESCRIPTION

The TDA9302H is a monolithic integrated circuit in HEPTAWATT^{TM} package. It is a high efficiency power booster for direct driving of vertical windings of TV yokes. It is intended for use in Color and B & W television as well as in monitors and displays.

PIN CONNECTIONS (top view)


7 NON-INVERTING INPUT
6 OUTPUT STAGE SUPPLY
5 OUTPUT
4 GROUND
3 FLYBACK GENERATOR
2 SUPPLY VOLTAGE
1 INVERTING INPUT
Tab connected to Pin 4

BLOCK DIAGRAM


+V_S
2
6
3
Flyback Generator
1
7
Power Amplifier
-
+
5
Thermal Protection
TDA9302H
4
YOKE

ABSOLUTE MAXIMUM RATINGS AT T_A = 25°C

Symbol	Parameter	Value	Unit
V_S	Supply Voltage (pin2)	35	V
V_5, V_6	Flyback Peak Voltage	60	V
V_3	Voltage at Pin3	+ V_s	
V_1, V_7	Amplifier Input Voltage	+ V_s ± 0.5	V
I_o	Deflection Output Current	+ 1.8	A
I_3	Pin 3 DC Current at $V_5 < V_2$	100	mA
P_{tot}	Total Power Dissipation at T_{case} = 90°C	15	W
T_{stg}, T_j	Storage and Junction Temperature	± 40, +150	5C

THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th\ (j±c)}$	Thermal Resistance Junction-case	Max.	4	5C/W

RECOMMENDED OPERATING CHARACTERISTICS AT T_A = 25°C

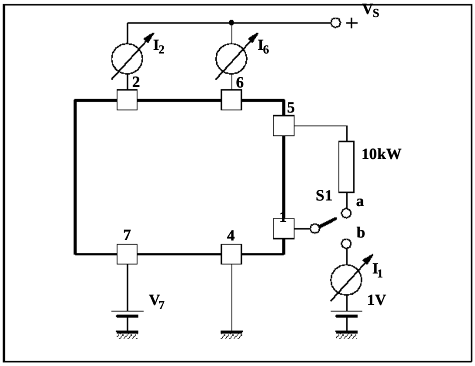
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{2M}	Recommended Supply Voltage			25		V
V_{2R}	Operating Supply Voltage Range		15		30	V
I_{5PP}	Deflection Output Current				2	App

ELECTRICAL CHARACTERISTICS
(refer to the test circuits, V_S = 35V, T_{amb} = 25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	Fig.
I_2	Pin 2 Quiescent Current	I_3 = 0, I_5 = 0			16	mA	1a
I_6	Pin 6 Quiescent Current	I_3 = 0, I_5 = 0			36	mA	1a
I_1	Amplifier Input Bias Current	V_1 = 1 V, V_7 = 2 V		± 0.1	± 1	mA	1a
		V_1 = 2 V, V_7 = 1 V		± 0.1	± 1	mA	1a
V_{3L}	Pin 3 Saturation Voltage to GND	I_3 = 20 mA		1	1.5	V	1c
V_5	Quiescent Output Voltage	V_s = 35V, R_a = 39 kW		18		V	1d
V_{5L}	Output Saturation Voltage to GND	I_5 = 1 A		0.9	1.3	V	1c
		I_5 = 0.7 A		0.7	1	V	1c
V_{5H}	Output Saturation Voltage to Supply	± I_5 = 1 A		1.5	2	V	1b
		± I_5 = 0.7 A		1.3	1.8	V	1b
T_j	Junction Temperature for Thermal Shut Down			140		5C	

Figure 1 : DC Test Circuits.

Figure 1 a : Measurement of I_1 ; I_2 ; I_6


V_S
+
I_2
I_6
2
6
5
10kW
S1
a
1
b
7
4
I_1
V_7
1V

S_1 : (a) I_2 and I_6 ; (b) I_1

Figure 1 b : Measurement of V_{5H}

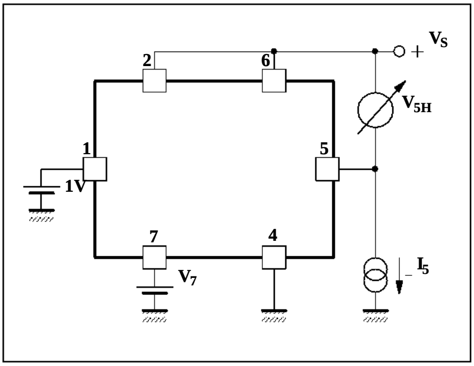
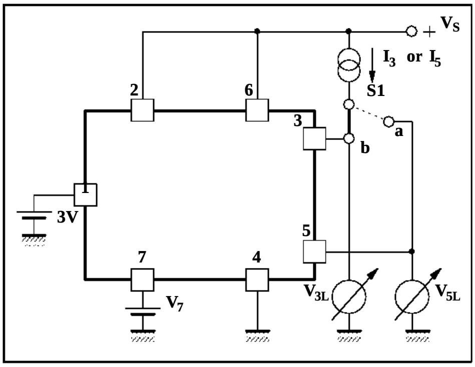
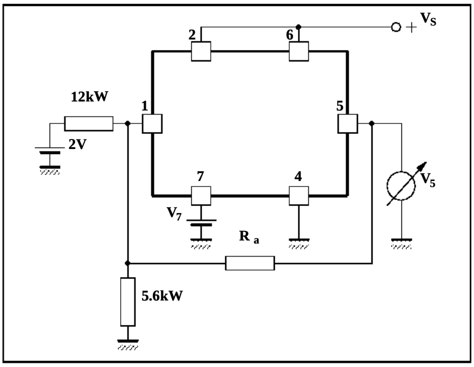

V_S
+
2
6
V_{5H}
1
5
1V
7
4
V_7
I_5

Figure 1c : Measurement of V_{3L} ; V_{5L}

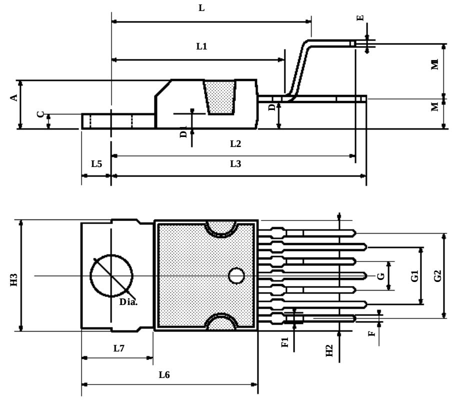

V_S
+
I_3 or I_5
S1
2
6
3
a
b
1
3V
5
7
4
V_7
V_{3L}
V_{5L}

S_1 : (a) V_{3L} ; (b) V_{5L}

Figure 1 d : Measurement of V_5


V_S
+
2
6
12kW
1
5
2V
7
4
V_5
V_7
R a
5.6kW

PACKAGE MECHANCAL DATA : 9 PINS - PLASTIC HEPTAWATT



Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			4.8			0.189
C			1.37			0.054
D	2.4		2.8	0.094		0.110
D1	1.2		1.35	0.047		0.053
E	0.35		0.55	0.014		0.022
F	0.6		08	0.024		0.031
F1			0.9			0.035
G	2.41	2.54	2.67	0.095	0.100	0.105
G1	4.91	5.08	5.21	0.193	0.200	0.205
G2	7.49	7.62	7.8	0.295	0.300	0.307
H2			10.4			0.409
H3	10.05		10.4	0.396		0.409
L		16.97			0.668	
L1		14.92			0.587	
L2		21.54			0.848	
L3		22.62			0.891	
L5	2.6		3	0.102		0.118
L6	15.1		15.8	0.594		0.622
L7	6		6.6	0.236		0.260
M		2.8			0.110	
M1		5.08			0.200	
Dia.	3.65		3.85	0.144		0.152

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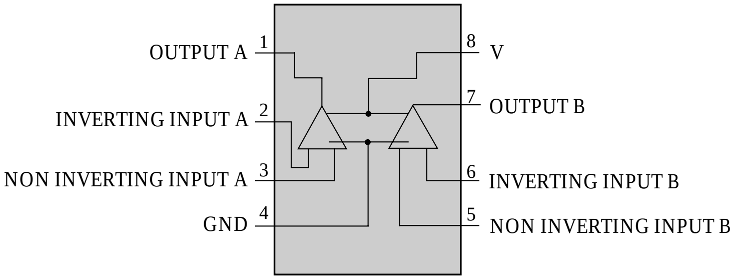
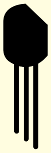
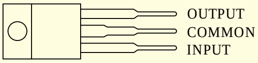
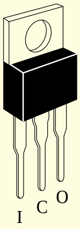
LM358


OUTPUT A
1
INVERTING INPUT A
2
NON INVERTING INPUT A
3
GND
4
8
V
7
OUTPUT B
6
INVERTING INPUT B
5
NON INVERTING INPUT B

Voltage Detector ICs

Type No.	Function	Operating Voltage (V)	Package
KIA7019P / F ~7045P / F	CPU Reset, Low Voltage Detector	1.9 ~ 4.5	TO - 92 
KIA7419P / F ~7445P / F	CPU Reset, High Voltage Detector	1.9 ~ 4.5	

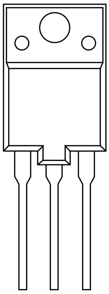
Voltage Regulator ICs

Type No.	Function	Typ Vo(V)	Max.			Package
			Io(A)	Vin(V)	PD(W)	
KIA7805P / PI	1.0A 3-Terminal Regulator	5	1.0	35	20.8	 OUTPUT COMMON INPUT TO-220AB
KIA7806P / PI		6				
KIA7808P / PI		8				
KIA7809P / PI		9				
KIA7810P / PI		10				
KIA7812P / PI		12				
KIA7815P / PI		15				
KIA7818P / PI		18		40		
KIA7820P / PI		20				
KIA7824P / PI		24				

TT2062

Horizontal Deflection Output For High Resolution Display, Color TV
High Speed Switching Applications

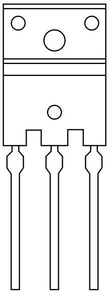
- High Voltage : V_{CBO}=1500V
- Low Saturation Voltage : $V_{CE(sat)}$=3V(Max.)
- High Speed : tf=0.2μs(Typ.)
- Collector Metal (Fin) is Fully covered with Mold Resin



Maximum Ratings (Ta=25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Collector-Base Voltage		V_{CBO}	1500	V
Collector-Emitter Voltage		V_{CEO}	800	V
Emitter-Base Voltage		V_{EBO}	5	V
Collector Current	DC	I_C	18	A
	Pulse	I_{CP}	35	
Base Current		I_B	4	A
Collector Power Dissipation (Tc=25°C)		P_C	85	W
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_{stg}	-55～150	°C

DMV1500M



CHARACTERISTIC	SYMBOL	RATING	UNIT
		B	
Transient Peak Reverse Voltage	V_{RSM}	1500	V
Peak Reverse Voltage	V_{RM}	1500	V
Average Forward Current	$I_{F(AV)}$	6	A
Peak Surge Forward Current	I_{FSM}	75	A
I²t Limiting Value	I²t	12.5	A²s
Junction Temperature	T_j	-40 ～ +150	°C
Storage Temperature	T_{stg}	-40 ～ +150	°C
Forward Voltage Drop	V_F	1.65 cat T_j=120 °C	V
Revene Recovery Time		cat I_F=1A T_j=25 °C	us

MTV021

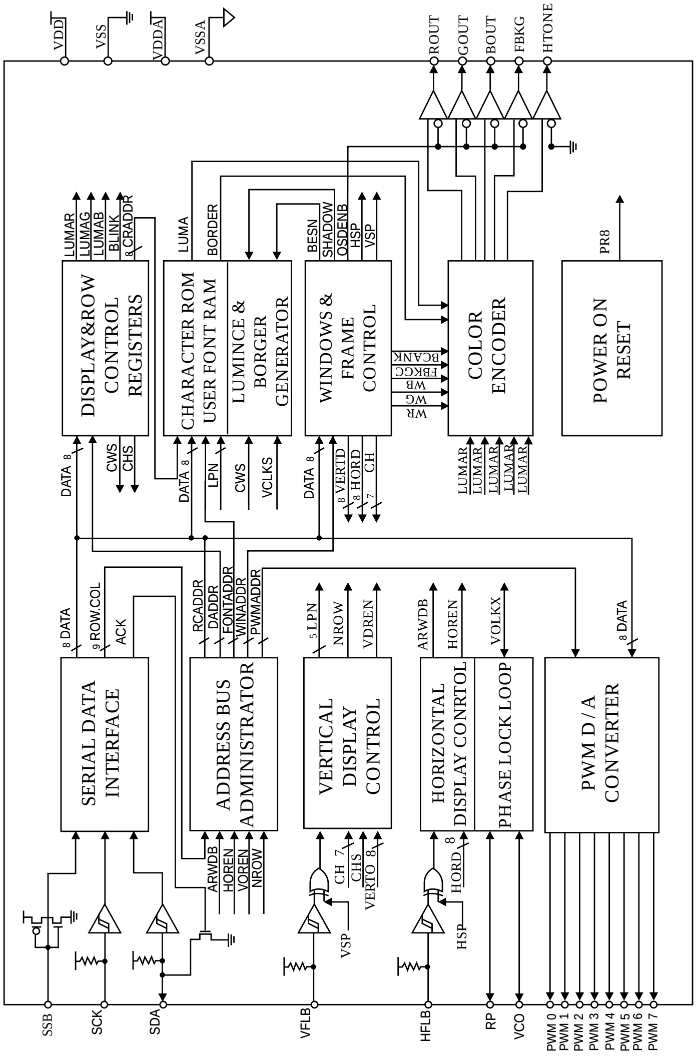
FEATURES

- Horizontal SYNC input up to 120 KHz.
- On-chip PLL circuitry up to 96MHz
- Programmable horizontal resolutions up to 1524 dots per display row
- Full-screen display consists of 15(rows) by 30(columns) characters.
- 12 x 18 dot matrices per character.
- Total of 272 characters and graphic fonts, including 256 standard and 16 multi-color mark ROM fonts.
- 8 color-selectable maximum per display character.
- 7 color-selectable maximum for charater background.
- Double character height and/or width conrrol.
- Programmable positioning for display screen center.
- Bordering, shadowing and blinking effect.
- Programmable character height(18 to 71 nl lines)control.
- Row to row spacing register to manipulate the constant display height.
- 4 programmable background windows with multi-level operation and shadowing on window effect.
- Software clears bit for full-screen erasing.
- Half tone and fast blanking output.
- Fade-in fade-out effect.
- 8-channel/8-bit PWM D/A converter output.
- Compatible with SPI bus or I^2C interface with slave address 7AH(slave address is mask option)
- 16-pin,20-pin or 24-pin PDIP package.

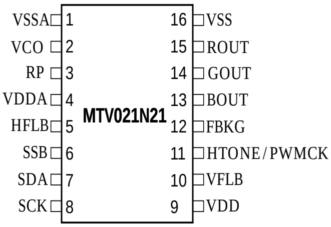
GENERAL DESCRIPTION

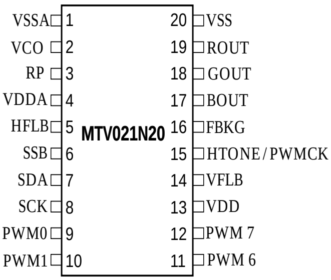
- MTV021 is designed for monitor applications to display built-in characters or fonts onto monitor screen. The display operation occurs by transferring data and control information from the micro-controller to RAM through a serial data interface. It can execute full-screen display automatically, as well as specific functions such as character background color, bordering, shadowing, blinking, double height and width, font by font color control, frame positioning, frame size control by character height and row-to-row spac-ing, horizontal display resolution, full-screen erasing, fade-in.fade-out effect, windowing effect and shad-owing on window.
- MTV021 provides 256 standard and 16 multi-color characters and graphic fonts for more efficacious applications. The full OSD menu is formed by 15 rows x30 columns, which can be positioned anywhere on the monitor screen by changing vertical or horizontal delay
- Moreover, MTV021 also provides 8 PWM DAC channels with 8-bit resolution and a PWM clock out put for external digital-to-analog control.

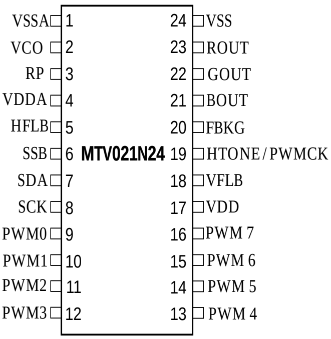
BLOCK DIAGRAM


VDD
VSS
VDDA
VSSA
ROUT
GOUT
BOUT
FBKG
HTONE
DISPLAY&ROW CONTROL REGISTERS
LUMAR
LUMAG
LUMAB
BLINK
CRADDR
DATA
CWS
CHS
CHARACTER ROM USER FONT RAM
LUMINCE & BORGER GENERATOR
LUMA
BORDER
LPN
VCLKS
WINDOWS & FRAME CONTROL
BESN
SHADOW
OSDENB
HSP
VSP
VERTD
HORD
CH
BCANK
FBKGC
WB
WG
WR
COLOR ENCODER
POWER ON RESET
PR8
SERIAL DATA INTERFACE
ROW.COL
ACK
ADDRESS BUS ADMINISTRATOR
RCADDR
DADDR
FONTADDR
WINADDR
PWMADDR
ARWDB
HOREN
VOREN
NROW
VERTICAL DISPLAY CONTROL
LPN
VDREN
VERTD
HORIZONTAL DISPLAY CONRTOL
PHASE LOCK LOOP
VOLKX
PWM D / A CONVERTER
SSB
SCK
SDA
VFLB
HFLB
RP
VCO
PWM 0
PWM 1
PWM 2
PWM 3
PWM 4
PWM 5
PWM 6
PWM 7

PIN CONNECTION


MTV021N21
VSSA 1
VCO 2
RP 3
VDDA 4
HFLB 5
SSB 6
SDA 7
SCK 8
16 VSS
15 ROUT
14 GOUT
13 BOUT
12 FBKG
11 HTONE/PWMCK
10 VFLB
9 VDD


MTV021N20
VSSA 1
VCO 2
RP 3
VDDA 4
HFLB 5
SSB 6
SDA 7
SCK 8
PWM0 9
PWM1 10
20 VSS
19 ROUT
18 GOUT
17 BOUT
16 FBKG
15 HTONE/PWMCK
14 VFLB
13 VDD
12 PWM 7
11 PWM 6


MTV021N24
VSSA 1
VCO 2
RP 3
VDDA 4
HFLB 5
SSB 6
SDA 7
SCK 8
PWM0 9
PWM1 10
PWM2 11
PWM3 12
24 VSS
23 ROUT
22 GOUT
21 BOUT
20 FBKG
19 HTONE/PWMCK
18 VFLB
17 VDD
16 PWM 7
15 PWM 6
14 PWM 5
13 PWM 4

PIN DESCRIPTIONS

Name	I/O	PIN NO.			Descriptions
		N16	N20	N24	
VSSA	-	1	1	1	Analog ground. This ground pin is used to internal analog circuitry.
VCO	I/O	2	2	2	Voltage Control Oscillator. This pin is used to control the internal oscillator frequency by DC voltage input from external low pass filter.
RP	I/O	3	3	3	Bias Resistor. The bias resistor is used to requlate the appropriate bias current for internal oscillator to resonate at specific dot frequency.
VDDA	-	4	4	4	Analog power supply. Positive 5V DC supply for internal analog circuity, Any a 0.1uF decoupling capacitor shouid be connected across to VDDA and VSSA.
HFLB	I	5	5	5	Horizontal input. This pin is used to input the horizontal synchronizing signal. It is a leading edge triggered and has an internal pull-up resistor.
SSB	I	6	6	6	Serial interface enable. It is used to enable the serial data and is also used to select the operation of I^{2}C or SPI bus. If this pin is left floating, I2C bus is enabled, otherwise the SPI bus is enabled.
SDA	I	7	7	7	Serial data input . The external data transfer through this pin to internal display registers and control registers. lt has an internal pull-up resistor.
SCK	I	8	8	8	Serial clock input. The clock-input pin is used to synchronize the data transfer. It has an internal pull-up resistor.
PWM0	O	-	9	9	Open-Drain PWM D/A converter 0. The output pulse width is programmable by the register of Row 15, Column 23.
PWM1	O	-	10	10	Open-Drain PWM D/A converter 1. The output pulse width is programmable by the register of Row 15, Column 24.
PWM2	O	-	-	11	Open-Drain PWM D/A converter 2. The output pulse width is programmable by the register of Row 15, Column 25.
PWM3	O	-	-	12	Open-Drain PWM D/A converter 3. The output pulse width is programmable by the register of Row 15, Column 26.

Name	I/O	PIN NO.			Descriptions
		N16	N20	N24	
PWM4	O	-	-	13	Open-Drain PWM D/A converter 4. The output pulse width is programmable by the register of Row 15, Column 27.
PWM5	O	-	-	14	Open-Drain PWM D/A converter 5. The output pulse width is programmable by the register of Row 15, Column 28.
PWM6	O	-	11	15	Open-Drain PWM D/A converter 6. The output pulse width is programmable by the register of Row 15, Column 29.
PWM7	O	-	12	16	Open-Drain PWM D/A converter 7. The output pulse width is programmable by the register of Row 15, Column 30.
VDD	-	9	13	17	Digital power supply. Positive 5V DC supply for internal digital circuitry and a 0.1uF decoupling capacitor should be connected across to VDD and VSS.
VFLB	I	10	14	18	Vertical input. This pin is used to input the vertical synchronizing signal. it is leading triggered and has an internal pull-up resistor.
HTONE/ PWMCK	O	11	15	19	Half tone output /PWM clock output. This is a multiplexed pin selected by PWMCK bit. This pin can be a PWM clock or used to attenuate R.G.B gain of VGA for the transparent windowing effect.
FBKG	O	12	16	20	Fast Blanking output. It is used to cut off external R,G,B signals of VGA white this chip is displaying characters or windows.
BOUT	O	13	17	21	Blue color output. It is a blue color video signal output.
GOUT	O	14	18	22	Green Color output. It is a green color video signal output.
ROUT	O	15	19	23	Red Color output. It is a red color video signal output.
VSS	O	16	20	24	Digital ground. This ground pin is used to internal digital circuity.

FUNCTIONAL DESCRIPTIONS

SERIAL DATA INTERFACE

The serial data interface receives data transmitted from an external controller. And there are 2 types of bus can be accessed through the serial data interface, one is SPI bus and other is I^{2}C bus.

SPI bus

While SSB pin is pulled to “ high” or “ low” level, the SPI bus operation is selected. And a valid transmission should be starting from pulling SSB to “low” level, enabling MTV021 to receiving mode, and retain “low”level until the last cycle for a complete data packet transfer. The protocol is shown in Figure 1.

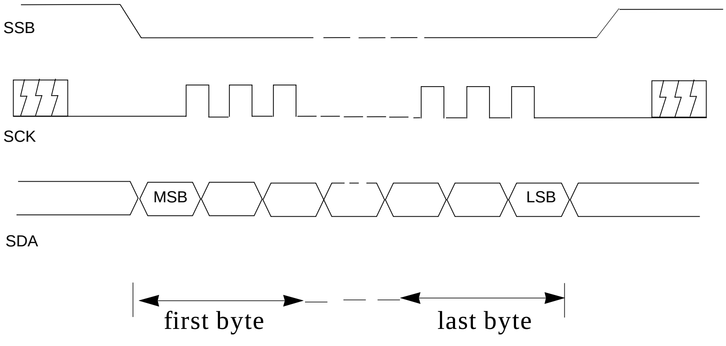
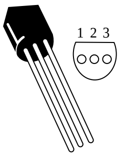


FIGURE 1. Data Transmission Protocol(SPI)

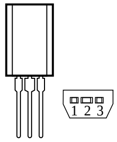
TRANSISTORS

Type No.	MAX. RATINGS			$V_{CE(SET)}$		Max				Package
	V_{CEO} (V)	I_C (mA)	P_C (mW)	(V)	I_C (mA)	I_B (mA)	1	2	3	
KSP45	350	300	1.5W	0.5	10	1	E	B	C	TO-92
KTA1273Y	-30	-2.0	1W	-2.0	-1.5	-30	E	C	B	TO-92L
KSA928Y	-30	-2.0A	1W	-2.0	-1.5A	-30	E	C	B	TO-92L
KSA1013	-160	-1.0A	0.9W	-1.5	-500	-50	E	C	B	TO-92L
KSD1616Y	50	1	0.75W	0.3	1A	50	E	C	B	TO-92
KSA733CY	-50	-150	250	-0.3	-100	-10	E	C	B	TO-92
IRF630A	200V	9A	72W	0.4 Ω(MAX) RDS(ON)		±30V (VGSS)	G	D	S	TO-220AB
KTC3198Y	50	150	625	0.25	100	10	E	C	B	TO-92
KSC945CY	50	150	250	0.15	100	10	E	C	B	TO-92
KTC3205Y	30	2A	1W	2.0	1.5A	30	E	B	C	TO-92L
KSP42	300	500	0.625	0.5	20	2	E	B	C	TO-92
KSP92	-300	-500	0.625	-0.5	-20	-2	B	B	C	TO-92
KRC102M	50	100	400	-0.3	-100	-0.88	E	C	B	TO-92M
2SK2545	600V (VDSS)	6A(ID)	40W (PT)	1.2 Ω (MAX) RDS(ON)		±30V (VGSS)	G	D	S	TO-220IS
YTA630	200V (VDSS)	10A(ID)	75W (PT)	0.8 Ω (MAX) RDS(ON)		±20V (VGSS)	G	D	S	TO-220AB

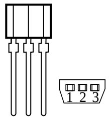
TO-92



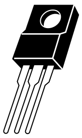
TO-92L



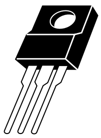
TO-92M



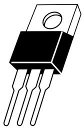
TO-220IS



TO-3P



TO-220AB



Replacement Parts List

PRODUCT SAFETY NOTICE : COMPONENTS MARKED WITH ⚠ HAVE SPECIAL CHARACTERISTICS IMPORTANT TO SAFETY.

ABBREVIATIONS :

RD	R-CARBON	CK	C-CERAMIC, HK
RS	R-METAL OXIDE	CE	C-ELECTROLYTIC
RX	R-CEMENT	CC	C-CERAMIC, TEMP
RN	R-METAL(±1%)	CQ	C-POLYESTER, C-POLYPROPYLENE
		CF	C-METAL POLYESTER C-METAL POLYPROPYLENE

NOTE : COMPONENTS OF THIS PARTS LIST CAN BE CHANGED FOR QUALITY IMPROVEMENT WITHOUT INFORMATION.

MAIN BOARD

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
1		E420453191C	AC INLET ASSY,Q770	⚠
2		3720101773	CONN-M,AC INLET SOLDER	
3		E4208519801	PCBA MA(I1*),Q770	
4		E4208819801	PCBA MA(I2*),Q770	
5		E4208919801	PCBA MA(I3*),Q770	
6		E4208419861	PCBA MA(A6*),Q770	
7		E4208419851	PCBA MA(A5*),Q770	
8		E4208419841	PCBA MA(A4*),Q770	
9		3040100886	PCB-SINGLE,Q770 MAIN F1 1	
10	BH01	3540200058	BD-FER,BFS3550	
11	BH02	3540200059	BD-FER,BFS3580	
12	BH03	3540200058	BD-FER,BFS3550	
13	BH04	3540200103	BD-FER,HF70 BTL 3.5*6B	
14	BH05	3540200058	BD-FER,BFS3550	
15	BH06	3540200058	BD-FER,BFS3550	
16	BH07	3540200059	BD-FER,BFS3580	
17	BH08	3540200058	BD-FER,BFS3550	
18	BP01	3540200059	BD-FER,BFS3580	
19	BP02	3540200058	BD-FER,BFS3550	
20	BV01	3540200058	BD-FER,BFS3550	
21	CH25	2131040020	CAP-MULT,0.1UF 50V Z AXI	
22	CH60	2131040020	CAP-MULT,0.1UF 50V Z AXI	
23	CM10	2133300004	CAP-MULT,33PF 50V J AXI	
24	CM12	2131040020	CAP-MULT,0.1UF 50V Z AXI	
25	C023	2131040020	CAP-MULT,0.1UF 50V Z AXI	
26	C027	2131040020	CAP-MULT,0.1UF 50V Z AXI	
27	DH01	DT1N4148	DIODE,1N4148 TAPING	
28	DH02	DT1N4936	DIODE,400V 1.0A 1N4936	
29	DH03	DT1N4936	DIODE,400V 1.0A 1N4936	
30	DH04	DT1N4936	DIODE,400V 1.0A 1N4936	
31	DH05	DTUZ-3.3BSB	DIODE,ZENER UZ-3.3BSB	
32	DH06	DT1N4148	DIODE,1N4148 TAPING	
33	DH07	3100500178	DI-SW,UF1G-5705 LEAD	
34	DH08	DT1N4148	DIODE,1N4148 TAPING	
35	DH09	DT1N4148	DIODE,1N4148 TAPING	
36	DH13	3100500178	DI-SW,UF1G-5705 LEAD	
37	DH14	DT1N4007	DIODE,1000V 1.0A TAP	
38	DH15	DT1N4007	DIODE,1000V 1.0A TAP	
39	DH16	DT1N4007	DIODE,1000V 1.0A TAP	
40	DH17	DT1N4007	DIODE,1000V 1.0A TAP	
41	DH18	DT1N4007	DIODE,1000V 1.0A TAP	
42	DH19	DT1N4937	DIODE,1N4937 TAPING	
43	DH20	DT1N4936	DIODE,400V 1.0A 1N4936	
44	DH21	DT1N4936	DIODE,400V 1.0A 1N4936	
45	DH22	DT1N4148	DIODE,1N4148 TAPING	
46	DH23	DT1N4148	DIODE,1N4148 TAPING	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
47	DH24	DT1N4007	DIODE,1000V 1.0A TAP	
48	DH25	DT1N4148	DIODE,1N4148 TAPING	
49	DH26	DT1N4007	DIODE,1000V 1.0A TAP	
50	DH27	DT1N4937	DIODE,1N4937 TAPING	
51	DH28	DTUF4007	DIODE,UF4007	
52	DH30	DT1N4148	DIODE,1N4148 TAPING	
53	DH31	DT1N4148	DIODE,1N4148 TAPING	
54	DH32	DT1N4936	DIODE,400V 1.0A 1N4936	
55	DM01	DT1N4148	DIODE,1N4148 TAPING	
56	DP01	DT1N5398	DIODE 1N5398 TAPING	
57	DP02	DT1N5398	DIODE 1N5398 TAPING	
58	DP03	DT1N5398	DIODE 1N5398 TAPING	
59	DP04	DT1N5398	DIODE 1N5398 TAPING	
60	DP05	DT1N4148	DIODE,1N4148 TAPING	
61	DP06	DT1N4937	DIODE,1N4937 TAPING	
62	DP07	DT1N4937	DIODE,1N4937 TAPING	
63	DP08	DT1N4148	DIODE,1N4148 TAPING	
64	DP09	DT1N4148	DIODE,1N4148 TAPING	
65	DP10	DT1N4148	DIODE,1N4148 TAPING	
66	DP12	DTUF4007	DIODE,UF4007	
67	DP14	DTUF4004	DIODE,UF4004	
68	DP16	DT1N4148	DIODE,1N4148 TAPING	
69	DV01	DTUF4002	DIODE,UF4002	
70	J001	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
71	J002	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
72	J003	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
73	J004	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
74	J005	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
75	J006	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
76	J007	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
77	J008	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
78	J009	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
79	J010	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
80	J011	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
81	J012	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
82	J013	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
83	J014	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
84	J015	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
85	J016	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
86	J017	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
87	J018	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
88	J020	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
89	J021	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
90	J022	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
91	J023	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
92	J024	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
93	J025	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
94	J026	375300002401	WIRE-NS-S43MM TAP. SDA 1/	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
95	J027	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
96	J028	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
97	J029	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
98	J030	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
99	J031	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
100	J032	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
101	J033	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
102	J034	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
103	J035	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
104	J036	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
105	J037	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
106	J038	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
107	J039	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
108	J040	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
109	J041	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
110	J042	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
111	J043	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
112	J044	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
113	J045	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
114	J046	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
115	J047	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
116	J048	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
117	J049	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
118	J050	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
119	J051	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
120	J052	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
121	J053	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
122	J054	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
123	J055	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
124	J056	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
125	J057	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
126	J058	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
127	J059	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
128	J060	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
129	J061	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
130	J062	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
131	J063	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
132	J064	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
133	J065	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
134	J066	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
135	J067	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
136	J068	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
137	J069	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
138	J070	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
139	J071	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
140	J072	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
141	J073	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
142	J074	375300002401	WIRE-NS-S43MM TAP. SDA 1/	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
143	J075	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
144	J076	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
145	J077	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
146	J078	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
147	J079	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
148	J081	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
149	J082	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
150	J083	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
151	LH04	E42019097250	COIL,PEAKING 22 UH AXIAL	
152	L007	E42019097250	COIL,PEAKING 22 UH AXIAL	
153	RH01	RD-8P0T0821J	RES-CF,RD 1/8W 820 OHM J	
154	RH02	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
155	RH03	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
156	RH04	RN-8P0T2201F	RES-MF,RN 1/8W 2.2KOHM F	
157	RH05	RN-8P0T1802F	RES-MF,RN 1/8W 18K OHM F	
158	RH06	RN-8P0T6491F	RES-MF,RN 1/8W 6.49KOHM F	
159	RH07	RD-8P0T0274J	RES-CF,RD 1/8W 270K OHM J	
160	RH08	RN-8P0T6801F	RES-MF,RN 1/8W 6.8KOHM F	
161	RH09	RN-8P0T1002F	RES-MF,RN 1/8W 10K OHM F	
162	RH10	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
163	RH100	RD-8P0T0471J	RES-CF,RD 1/8W 470 OHM J	
164	RH101	RD-4P0T0474J	RES-CF,RD 1/4W 470K OHM J	
165	RH11	RN-8P0T2052F	RES-MF,RN 1/8W 20.5KOHM F	
166	RH12	RN-8P0T2052F	RES-MF,RN 1/8W 20.5KOHM F	⚠
167	RH13	2441602003	RES-MF,16K 0.125W F A	⚠
168	RH14	RD-8P0T0332J	RES-CF,RD 1/8W 3.3K OHM J	⚠
169	RH15	2442941001	RES-MF,2.94K 0.125W F A	
170	RH16	2402709006	RES-CF,27 0.5W J M	
171	RH17	2401001010	RES-CF,1K 0.5W J M	
172	RH18	RD-8P0T0752J	RES-CF,RD 1/8W 7.5K OHM J	
173	RH19	RD-8P0T0363J	RES-CF,RD 1/8W 36K OHM J	
174	RH20	RD-8P0T0123J	RES-CF,RD 1/8W 12KOHM J	
175	RH21	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
176	RH22	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
177	RH23	2401001010	RES-CF,1K 0.5W J M	
178	RH24	RD-8P0T0512J	RES-CF,RD 1/8W 5.1K OHM J	
179	RH26	RD-8P0T0362J	RES-CF,RD 1/8W 3.6K OHM J	
180	RH27	RD-8P0T0274J	RES-CF,RD 1/8W 270K OHM J	
181	RH28	RD-8P0T0362J	RES-CF,RD 1/8W 3.6K OHM J	
182	RH29	RD-4P0T0220J	RES-CF,RD 1/4W 22 OHM J	
183	RH30	2401801006	RES-CF,1.8K 0.5W J M	
184	RH31	RD-8P0T0104J	RES-CF,RD 1/8W 100K OHM J	
185	RH32	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
186	RH33	RD-4P0T0362J	RES-CF,RD 1/4W 3.6K OHM J	
187	RH34	2441972001	RES-MF,19.7K 0.125W F A	⚠
188	RH35	RD-4P0T0681J	RES-CF,RD 1/4W 680 OHM J	
189	RH36	RN-8P0T5101F	RES-MF,RN 1/8W 5.1KOHM F	⚠
190	RH37	2542208003	RES-FUS,2.2 1W J M	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
191	RH38	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
192	RH39	RD-8P0T0820J	RES-CF,RD 1/8W 82 OHM J	
193	RH40	RD-4P0T0332J	RES-CF,RD 1/4W 3.3K OHM J	
194	RH41	RD-4P0T0220J	RES-CF,RD 1/4W 22 OHM J	
195	RH42	RD-8P0T0223J	RES-CF,RD 1/8W 22K OHM J	
196	RH45	2461801006	RES-MOF,1.8K 2W J M	
197	RH46	RD-8P0T0150J	RES-CF,RD 1/8W 15 OHM J	
198	RH47	RD-8P0T0473J	RES-CF,RD 1/8W 47K OHM J	
199	RH48	2404700007	RES-CF,470 0.5W J M	
200	RH50	RD-4P0T0334J	RES-CF,RD 1/4W 330K OHM J	
201	RH51	2463008001	RES-MOF,3 2W J M	
202	RH52	2461000007	RES-MOF,100 1W J M	
203	RH53	RD-8P0T0222J	RES-CF,RD 1/8W 2.2K OHM J	
204	RH54	2463009001	RES-MOF,30 2W J M	
205	RH55	RD-4P0T0122J	RES-CF,RD 1/4W 1.2K OHM J	
206	RH56	2401500007	RES-CF,150 0.5W J A	
207	RH57	2461501003	RES-MOF,1.5K 2W J M	
208	RH58	RD-4P0T0223J	RES-CF,RD 1/4W 22K OHM J	
209	RH59	RD-4P0T0223J	RES-CF,RD 1/4W 22K OHM J	
210	RH60	RD-4P0T0223J	RES-CF,RD 1/4W 22K OHM J	
211	RH61	RD-8P0T0123J	RES-CF,RD 1/8W 12KOHM J	
212	RH62	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
213	RH63	RD-8P0T0123J	RES-CF,RD 1/8W 12KOHM J	
214	RH64	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
215	RH65	RD-8P0T0123J	RES-CF,RD 1/8W 12KOHM J	
216	RH66	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
217	RH67	2463008001	RES-MOF,3 2W J M	
218	RH68	2463009001	RES-MOF,30 2W J M	
219	RH69	RD-4P0T0274J	RES-CF,RD 1/4W 270K OHM J	
220	RH70	RD-8P0T0244J	RES-CF,RD 1/8W 240KOHM J	
221	RH71	RD-8P0T0183J	RES-CF,RD 1/8W 18K OHM J	
222	RH72	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
223	RH73	RD-8P0T0332J	RES-CF,RD 1/8W 3.3K OHM J	
224	RH74	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
225	RH75	RD-8P0T0124J	RES-CF,RD 1/8W 120K OHM J	
226	RH76	RD-8P0T0222J	RES-CF,RD 1/8W 2.2K OHM J	
227	RH77	RD-8P0T0513J	RES-CF,RD 1/8W 51K OHM J	
228	RH78	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
229	RH80	RD-8P0T0123J	RES-CF,RD 1/8W 12KOHM J	
230	RH82	2407503002	RES-CF,750K 0.25W J A	
231	RH83	RD-4P0T0364J	RES-CF,RD 1/4W 360K OHM J	
232	RH84	RD-8P0T0182J	RES-CF,RD 1/8W 1.8K OHM J	
233	RH85	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
234	RH86	240270800101	RES-CF,2.7 0.5W J M	
235	RH87	RD-8P0T0473J	RES-CF,RD 1/8W 47K OHM J	
236	RH88	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
237	RH89	RD-8P0T0243J	RES-CF,RD 1/8W 24K OHM J	
238	RH90	RD-4P0T0101J	RES-CF,RD 1/4W 100 OHM J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
239	RH91	RD-4P0T0753J	RES-CF,RD 1/4W 75KOHM J	
240	RH92	RD-4P0T0475J	RES-CF,RD 1/4W 4.7M OHM J	
241	RH93	RD-8P0T0152J	RES-CF,RD 1/8W 1.5K OHM J	
242	RH94	RD-8P0T0823J	RES-CF,RD 1/8W 82K OHM J	
243	RH96	RD-4P0T0475J	RES-CF,RD 1/4W 4.7M OHM J	
244	RH97	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
245	RH98	RD-8P0T0243J	RES-CF,RD 1/8W 24K OHM J	
246	RH99	2540228001	RES-FUS,0.22 0.5W J A	
247	RM01	RD-8P0T0432J	RES-CF,RD 1/8W 4.3KOHM J	
248	RM02	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
249	RM04	RD-8P0T0105J	RES-CF,RD 1/8W 1M OHM J	
250	RM05	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
251	RM06	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
252	RM07	RD-8P0T0152J	RES-CF,RD 1/8W 1.5K OHM J	
253	RM08	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
254	RM09	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
255	RM11	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
256	RM12	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
257	RM13	RD-8P0T0473J	RES-CF,RD 1/8W 47K OHM J	
258	RM14	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
259	RM16	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
260	RM17	RD-8P0T0473J	RES-CF,RD 1/8W 47K OHM J	
261	RM18	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
262	RM19	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
263	RM20	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
264	RM21	RD-8P0T0153J	RES-CF,RD 1/8W 15K OHM J	
265	RM22	RD-8P0T0104J	RES-CF,RD 1/8W 100K OHM J	
266	RM29	RD-8P0T0432J	RES-CF,RD 1/8W 4.3KOHM J	
267	RM32	RD-4P0T0330J	RES-CF,RD 1/4W 33 OHM J	
268	RM33	RD-4P0T0302J	RES-CF,RD 1/4W 3K OHM J	
269	RM34	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
270	RM36	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
271	RM37	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
272	R011	2401000008	RES-CF,100 0.5W J M	
273	R012	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
274	R013	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
275	R014	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
276	R015	RD-8P0T0101J	RES-CF,RD 1/8W 100 OHM J	
277	R016	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
278	R017	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
279	R018	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
280	R019	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
281	R020	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
282	R021	RD-8P0T0151J	RES-CF,RD 1/8W 150 OHM J	
283	R022	RD-8P0T0105J	RES-CF,RD 1/8W 1M OHM J	
284	R023	RD-8P0T0562J	RES-CF,RD 1/8W 5.6K OHM J	
285	R024	RD-8P0T0622J	RES-CF,RD 1/8W 6.2K OHM J	
286	R025	RD-8P0T0562J	RES-CF,RD 1/8W 5.6K OHM J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
287	R045	RD-8P0T0202J	RES-CF,RD 1/8W 2K OHM J	
288	R046	RD-8P0T0202J	RES-CF,RD 1/8W 2K OHM J	
289	RP01	2401004008	RES-CF,1M 0.5W J M	
290	RP02	RD-4P0T0271J	RES-CF,RD 1/4W 270 OHM J	
291	RP03	RD-4P0T0471J	RES-CF,RD 1/4W 470 OHM J	
292	RP04	2465602005	RES-MOF,56K 2W J M	
293	RP05	2401004008	RES-CF,1M 0.5W J M	
294	RP07	2442402005	RES-MF,24K 0.125W F A	
295	RP08	RD-4P0T0220J	RES-CF,RD 1/4W 22 OHM J	
296	RP09	2541001002	RES-FUS,1K 0.25W J A	
297	RP10	RD-4P0T0102J	RES-CF,RD 1/4W 1K OHM J	
298	RP12	RD-8P0T0204J	RES-CF,RD 1/8W 200K OHM J	
299	RP13	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
300	RP14	RD-8P0T0154J	RES-CF,RD 1/8W 150K OHM J	
301	RP15	RD-4P0T0331J	RES-CF,RD 1/4W 330 OHM J	
302	RP16	2442322002	RES-MF,23.2K 0.125W F A	
303	RP17	RD-4P0T04R7J	RES-CF,RD 1/4W 4.7 OHM J	
304	RP18	2401004008	RES-CF,1M 0.5W J M	
305	RP19	RD-4P0T0623J	RES-CF,RD 1/4W 62K OHM J	
306	RP20	RD-8P0T0223J	RES-CF,RD 1/8W 22K OHM J	
307	RP21	RD-4P0T0154J	RES-CF,RD 1/4W 150K OHM J	
308	RP22	2465102001	RES-MOF,51K 1W J M	
309	RP23	RD-8P0T0154J	RES-CF,RD 1/8W 150K OHM J	
310	RP24	RD-4P0T0102J	RES-CF,RD 1/4W 1K OHM J	
311	RP25	RD-4P0T0681J	RES-CF,RD 1/4W 680 OHM J	
312	RP27	2406800008	RES-CF,680 0.5W J M	
313	RP28	2461001005	RES-MOF,1K 1W J M	
314	RP29	2463309006	RES-MOF,33 1W J M	
315	RP30	RD-8P0T0271J	RES-CF,RD 1/8W 270 OHM J	
316	RP31	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
317	RP32	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
318	RV01	2545108002	RES-FUS,5.1 1W J M	
319	RV02	RN-8P0T5601F	RES-MF,RN 1/8W 5.6KOHM F	
320	RV04	2401008007	RES-CF,1 0.5W J M	
321	RV05	RD-4P0T01R5J	RES-CF,RD 1/4W 1.5 OHM	
322	RV07	2542708001	RES-FUS,2.7 1W J A	
323	RV08	RD-4P0T0332J	RES-CF,RD 1/4W 3.3K OHM J	
324	RV09	2401001010	RES-CF,1K 0.5W J M	
325	RV10	RD-8P0T0562J	RES-CF,RD 1/8W 5.6K OHM J	
326	RV11	RD-8P0T0562J	RES-CF,RD 1/8W 5.6K OHM J	
327	RV18	RN-4P0T3402F	RES-MF,RN 1/4W 34KOHM F	
328	RV19	RN-4P0T5601F	RES-MF,RN 1/4W 5.6KOHM F	
329	ZDH01	DTUZ-12BSB	DIODE,ZENER UZ-12BSB TAP	
330	ZDH02	DTUZ-13B	DIODE,ZENER UZ-13B	
331	ZDH03	DTUZ-13B	DIODE,ZENER UZ-13B	
332	ZDM01	DTUZ-6.2BSB	DIODE,ZENER UZ-6.2BSB T	
333	ZDM02	DTUZ-6.2BSB	DIODE,ZENER UZ-6.2BSB T	
334	ZDM03	DTUZ-5.1BSB	DIODE,ZENER UZ-5.1BSB TAP	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
335	ZDM04	DTUZ-5.1BSB	DIODE,ZENER UZ-5.1BSB TAP	
336	ZDM05	DTUZ-5.1BSB	DIODE,ZENER UZ-5.1BSB TAP	
337	ZD001	DTUZ-5.6BSB	DIODE,ZENER UZ-5.6BSB TAP	
338	CH01	CF93BT1J474J	CAP-MPE,63V 0.47UF J	
339	CH02	CQ92BT2A154J	CAP-PE,100V 0.15UF J	
340	CH03	CQ92BT2A822J	CAP-PE,100V 0.0082UF J	
341	CH04	CQ92BT2A104J	CAP-PE,100V 0.1UF J	
342	CH05	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
343	CH06	E42007019220	CAP-PP/PE,100V 680PF J	
344	CH07	CE04BT1H010M	CAP-EL,SMS 50V 1UF M	
345	CH08	CQ92BT2A152J	CAP-PE,100V 1500PF J	
346	CH09	CQ92BT2A102J	CAP-PE,100V 0.001UF J	
347	CH10	CE04BT1HR47M	CAP-EL,SMS 50V 0.47UF M	
348	CH11	CQ92BT2A332J	CAP-PE,100V 3300PF J	
349	CH12	CE04BT1H4R7M	CAP-EL,SMS 50V 4.7UF M	
350	CH13	CQ92BT2A333J	CAP-PE,100V 0.033UF J	
351	CH15	CQ92BT2A332J	CAP-PE,100V 3300PF J	
352	CH16	CF93BT1J105J	CAP-MPE,63V 1UF J	
353	CH17	CK45BT3A331K	CAP-CE,1KV 330PF K TAP	
354	CH18	214474001702	CAP-M-P,0.47UF 250V J 7.5	
355	CH19	CE04BT1H100M	CAP-EL,SMS 50V 10UF M	
356	CH20	CQ92BT2A182J	CAP-PE,100V 1800PF J	
357	CH21	CF93BT1J334J	CAP-MPE,63V 0.33UF J	
358	CH22	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
359	CH23	217472001501	CAP-P-F,4700PF 1600V J 7.	⚠
360	CH24	CE04IT1V470M	CAP-EL,KME 35V 47UF M	
361	CH26	CK45BT3A221K	CAP-CD,1KV 220PF K TAP	
362	CH28	CE04IT1H010M	CAP-EL,KME 50V 1UF M	
363	CH30	CE04IT1H010M	CAP-EL,KME 50V 1UF M	
364	CH31	2174720021	CAP-P-F,4700PF 800V J RAD	⚠
365	CH32	2142240021	CAP-M-P,0.22UF 250V J RAD	
366	CH33	CE04BT1H010M	CAP-EL,SMS 50V 1UF M	
367	CH34	2148230001	0.082 UF 250 V J RAD	
368	CH35	CQ92BT2A473J	CAP-PE,100V 0.047UF J	
369	CH38	CK45BT3A102K	CAP-CD,1KV 1000PF 10%	
370	CH39	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
371	CH40	CE04BT1C100M	CAP-EL,SMS 16V 10UF M TAP	
372	CH41	2101510007	CAP-CER,150PF 1KV K Y5P	
373	CH43	CQ92BT2A473J	CAP-PE,100V 0.047UF J	
374	CH44	CQ92BT2A223J	CAP-PE,100V 0.022UF J	
375	CH46	CE04BT1E101M	CAP-EL,SMS 25V 100UF M	
376	CH47	2002280012	CAP-AL,0.22UF 160V M 5*11	
377	CH48	CE04BT2C010M	CAP-EL,SMS 160V 1UF M	
378	CH49	CQ92BT2A102J	CAP-PE,100V 0.001UF J	
379	CH50	CE04BT1E101M	CAP-EL,SMS 25V 100UF M	
380	CH51	CQ92BT2A104J	CAP-PE,100V 0.1UF J	
381	CH52	CQ92BT2A102J	CAP-PE,100V 0.001UF J	
382	CH54	CE04BT2C220M	CAP-EL,SMS 160V 22UF M	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
383	CH57	2002210071	CAP-AL,220UF 16V M 8*9 P	
384	CH58	2172230011	CAP-P-F,0.022UF 250V J RA	
385	CH59	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
386	CH61	CF93BT1J224J	CAP-MPE,63V 0.22UF J	
387	CM01	CE04BT1H010M	CAP-EL,SMS 50V 1UF M	
388	CM02	CE04BT1HR33M	CAP-EL,SMS 50V 0.33UF M	
389	CM05	CC45CT1H220J	CAP-CD,50V 22PF J	
390	CM06	CC45CT1H220J	CAP-CD,50V 22PF J	
391	CM08	CE04BT1H0R1M	CAP-EL,SMS 50V 0.1UF M	
392	CM09	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
393	CM11	E42007019220	CAP-PP/PE,100V 680PF J	
394	CM13	CE04BT1E470M	CAP-EL,SMS 25V 47UF M	
395	CM14	CE04BT1H010M	CAP-EL,SMS 50V 1UF M	
396	CM15	CE04BT1H010M	CAP-EL,SMS 50V 1UF M	
397	CO22	CQ92BT2A104J	CAP-PE,100V 0.1UF J	
398	CO24	CE04BT1C101M	CAP-EL,SMS 16V 100UF M	
399	CO25	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
400	CO26	CE04BT1C101M	CAP-EL,SMS 16V 100UF M	
401	CO28	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
402	CO29	CQ92BT2A222J	CAP-PE,100V 0.0022UF J	
403	CP02	E42007027050	CAP-CD,Y2 2200PF M TAP	
404	CP03	E42007027050	CAP-CD,Y2 2200PF M TAP	
405	CP08	2001010091	CAP-AL,100UF 25V M 6.3*11	
406	CP10	CQ92BT2A272J	CAP-PE,100V 0.0027UF J	
407	CP11	CK45BT3A101K	CAP-CD,1KV 100PF 10%	
408	CP13	CC45CT1H471J	CAP-CD,50V 470PF J	
409	CP14	CC45CT1H471J	CAP-CD,50V 470PF J	
410	CP15	CQ92BT2A332J	CAP-PE,100V 3300PF J	
411	CP16	CF93BT1J334J	CAP-MPE,63V 0.33UF J	
412	CP17	CQ92BT2A103J	CAP-PE,100V 0.01UF J	
413	CP18	CQ92BT2A332J	CAP-PE,100V 3300PF J	
414	CP19	2002290042	CAP-AL,2.2UF 50V M 5*11 N	
415	CP21	2002210076	CAP-AL,220UF 100V M 13*25	
416	CP23	2002200073	CAP-AL,22UF 160V M 10*20	
417	CP24	2004710059	CAP-AL,470UF 16V M 8*12 P	
418	CP25	2004710059	CAP-AL,470UF 16V M 8*12 P	
419	CP27	CE04BT1E681M	CAP-EL,SMS 25V 680UF M	
420	CP28	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
421	CP29	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
422	CP31	CE04BT1E471M	CAP-EL,SMS 25V 470UF M	
423	CP32	2101020018	CAP-CD,1000PF Y2 K TAP	
424	CP33	2101020018	CAP-CD,1000PF Y2 K TAP	
425	CV01	217562001401	CAP-P-F,5600PF 100V J 5.0	
426	CV03	2004710059	CAP-AL,470UF 16V M 8*12 P	
427	CV04	2004710059	CAP-AL,470UF 16V M 8*12 P	
428	CV05	2001010093	CAP-AL,100UF 35V M 8*11.5	
429	CV06	2141040020	CAP-M-P,0.1UF 250V J RAD	
430	CV07	CQ92BT2A104J	CAP-PE,100V 0.1UF J	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
431	CV08	2002200067	CAP-AL,22UF 16V M 5*11 P	
432	CV09	CQ92BT2A224J	CAP-PE,100V 0.22UF J	
433	CV10	CQ92BT2A102J	CAP-PE,100V 0.001UF J	
434	FP01	E42076013010	FUSE CLIP,TAPING	
435	LH02	3500100523	INDUCT-FIX,DR0808 8.2MH M	
436	QH01	TTKSC945CY	TR,KSC945C-Y	
437	QH02	3110100687	TR-GEN,KSA928AY LEAD	
438	QH05	TTKSC945CY	TR,KSC945C-Y	
439	QH06	TTKSA733CY	TR,KSA733C-Y	
440	QH08	TT2N7000	TR,2N7000	
441	QH10	3110100730	TR-GEN,KSD1616-YTA LEAD	
442	QH14	TTKSC945CY	TR,KSC945C-Y	
443	QH15	TTKSC945CY	TR,KSC945C-Y	
444	QH16	TTKSC945CY	TR,KSC945C-Y	
445	QH17	TTKSP45	TR,KSP45	
446	QH18	3110100689	TR-GEN,KSA1013Y LEAD	
447	QH19	TTKSC945CY	TR,KSC945C-Y	
448	QH21	TTKSA733CY	TR,KSA733C-Y	
449	QH22	TTKSC945CY	TR,KSC945C-Y	
450	QM01	TTKTC200Y	TR,KTC200Y TAP	
451	QM02	TTKTA200Y	TR,KTA200Y TAP	
452	QM03	TTKTC1815Y	TR,KTC3198Y	
453	QM04	TTKSC945CY	TR,KSC945C-Y	
454	QM05	TTKSA733CY	TR,KSA733C-Y	
455	QM06	TTKRC102M	TR,SWITCHING KRC102M	
456	QP01	TTKSP45	TR,KSP45	
457	QP02	TTKSC945CY	TR,KSC945C-Y	
458	QP03	3110100705	TR-GEN,KRC105M LEAD	
459	QP05	3110100687	TR-GEN,KSA928AY LEAD	
460	QP07	3110100687	TR-GEN,KSA928AY LEAD	
461	QP08	TTKRC102M	TR,SWITCHING KRC102M	
462	QP09	TTKTA1015Y	TR,KTA1266Y	
463	QV01	TTKSC945CY	TR,KSC945C-Y	
464	RH43	246100800701	RES-MOF,1 2W J M R-FORMIN	
465	RH44	246100800701	RES-MOF,1 2W J M R-FORMIN	
466	RH49	246430900301	RES-MOF,43 2W J R-FORMING	
467	RH79	246430900301	RES-MOF,43 2W J R-FORMING	
468	RH95	246120100601	RES-MOF,1.2K 2W J R-FORM	
469	RP06	246220300501	RES-MOF,220K 2W J R-FORMI	
470	RP11	246022800401	RES-MOF,0.22 2W R-FORM	
471	RP26	246220900601	RES-MOF,22 2W J R-FORMING	
472	XM01	3530200581	VIB-QUARTZ,12MHZ 22PF ATS	
473	AI01A	6130014100	EYELET,2.7PAI BRASS T=0.4	
474	AI01B	6130014100	EYELET,2.7PAI BRASS T=0.4	
475	CNM01	372010105301	CONN-M,POST 1P DEGT235 14	
476	CP05A	6130014100	EYELET,2.7PAI BRASS T=0.4	
477	CP05B	6130014100	EYELET,2.7PAI BRASS T=0.4	
478	G2	372010105301	CONN-M,POST 1P DEGT235 14	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
479	ICH02	3200001531	IC-LIN,LM358N DIP	
480	ICM02	3203000819	IC-MEMO,S524C80D81-DCB0	
481	ICP01	3200001536	IC-LIN,UC3843B DIP	
482	LP01A	6130014200	EYELET,1.6PAI BRASS T=0.4	
483	LP01B	6130014200	EYELET,1.6PAI BRASS T=0.4	
484	LP01C	6130014200	EYELET,1.6PAI BRASS T=0.4	
485	LP01D	6130014200	EYELET,1.6PAI BRASS T=0.4	
486	NTC01A	6130014200	EYELET,1.6PAI BRASS T=0.4	
487	NTC01B	6130014200	EYELET,1.6PAI BRASS T=0.4	
488	QH09A	6130014200	EYELET,1.6PAI BRASS T=0.4	
489	QH09B	6130014200	EYELET,1.6PAI BRASS T=0.4	
490	QH09C	6130014200	EYELET,1.6PAI BRASS T=0.4	
491	TH02A	6130014200	EYELET,1.6PAI BRASS T=0.4	
492	TH02B	6130014200	EYELET,1.6PAI BRASS T=0.4	
493	TH04A	6130014100	EYELET,2.7PAI BRASS T=0.4	
494	TH04B	6130014100	EYELET,2.7PAI BRASS T=0.4	
495	TH04C	6130014100	EYELET,2.7PAI BRASS T=0.4	
496	WHV01	372010105301	CONN-M,POST 1P DEGT235 14	
497	DH12	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
498	DH12	M31100030012	NUT HEX,6N1-3 MSZPC	
499	DH12	3102000245	DI-REC,DMV1500M LEAD	
500	ICV01	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
501	ICV01	UTDA9302H	IC,TDA9302H VER AMP	
502	ICV01	6124036600	H-SINKINK V,L=40 H=18.0 V	
503	QH03	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
504	QH03	M31100030012	NUT HEX,6N1-3 MSZPC	
505	QH03	3110100665	TR-GEN,KTD2061-Y LEAD	
506	QH07	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
507	QH07	3114000140	FET,YTA630 LEAD S770	
508	QH07	6124020510	H-SINKINK POWER,L=35 H=17	
509	QH09	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
510	QH09	M31100030012	NUT HEX,6N1-3 MSZPC	
511	QH09	3110100753	TR-GEN,TT2062 LEAD	
512	QH09	6120051000	SHLD-CASE,F/SHLD FBT ASY,	
513		6120043000	SOLDER GRIP,V770	
514		6120050000	SHLD-PL,FENCE SHIELD FBT	
515	QH11	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
516	QH11	3114000124	FET,IRF630A/IRF630M	
517	QH11	6124020508	H-SINK POWER,B790 L=22MM	
518	QP04	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
519	QP04	3114000106	FET,2SK2545-LB104 LEAD	⚠
520	QP04	6124036602	H-SINK V,L=40,H=18 Q770	
521	CH27	2172240013	CAP-P-F,0.22UF 250V J RAD	
522	CH29	214494000101	CAP-M-P,0.49UF 250V J 20.	
523	CNM04	3720101389	CONN-M,SMW200-07P	
524	CNM05	3720101387	CONN-M,SMW200-05P	
525	CNM06	3720101978	CONN-M,SMW200-15 15	
526	CP01	E4200700909B	CAP-X,250VAC 0.22UF M 15.	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
527	CP04	2141540010	CAP-M-P,0.15UF 250V M PP	
528	CP05	2001810001	CAP-AL,180UF 400V M 25.4*	
529	FP01	E42025012060	FUSE,TIME LAG 19181 3.15A	
530	ICH01	3200001530	IC-LIN,TDA9116 32P SDIP D	
531	ICP02	3200001186	IC-LIN,L7805CV TO2	
532	LP01	352020008601	FLT-LC,SEQ2828 25MH MIN	
533	PTC01	341130000901	POSISTOR,90HM 2P CASE STI	
534	QH12	3114000080	FET,2SK2134-S12 LEAD	
535	QH13	3114000124	FET,IRF630A/IRF630M	
536	RLP01	3710100085	RELAY,DY3M-DC12V 5A 250V	
537	SWH01	E42027014010	LEVER SWITCH,30'C 3P	
538	TH01	3510300160	TRAN-SW,HDT EI1916 G910	⚠
539	TH03	3510300186	TRAN-SW,FOCUS EE2017 V771	
540	TP01	3510200132	TRAN-PW,EER3541 V771 WO/A	
541	TP02	E4203109004A	TRANS SYNC,UU1116 TUBE	
542		6120048600	SHLD-PL,G910/P911 MCU COV	
543	AI01	3720101302	CONN-M,YW396-03V(2ND P DE	
544	AR01	2502001003	RES NET,2K 1/8W J SIP 6P	
545	CH45	210472001801	CAP-CER,1KV 472K FOR	
546	CH53	2102230017	CAP-CER,0.022UF 1KV J Z4U	
547	CNM02	3720101396	CONN-M,SMW250-02 2	
548	CNM03	3720101227	CONN-M,5045-3A 3	
549	CP07	CK45BF2H103K	CAP-CD,500V 0.01UF K	
550	CP09	210472001501	CAP-CER,Y1 4700PF M NO-CU	
551	DH10	3104100142	DI-SCHOT,1N5822 LEAD	
552	DH11	3100500094	DI-SW,ERD07-15L LEAD	
553	DP11	3100500181	DI-SW,GUR460L-5703 LEAD	
554	DP13	3100500163	DI-SW,RG4 LF-L1(015-206)	
555	DP15	3100500163	DI-SW,RG4 LF-L1(015-206)	
556	ICM01	3205001382	IC-U,WT62P1-K42 DIP MTP	
557	ICM01	3721100830	CONN-F,WSDIF-42T-1.778MM	
558	IC002	3204000577	IC-INT,MTV021 9LANGUAGE D	
559	LH01	3500101612	INDUCT-FIX,AR5*30 V770 K	⚠
560	LH03	3500100511	INDUCT-FIX,SIZE DR1523 5P	
561	NTC01	E4207708409A	THERMISTOR 180HM 13PAI TA	
562	TH02	3500101856	INDUCT-FIX,Q770 LIN COIL	
563	TH04	3510500090	FBT,Q770	⚠

CRT BOARD

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
1		E4208619802	PCBA CRT(T1*),Q770	
2		E4208519802	PCBA CRT(I1*),Q770	
3		E4208919802	PCBA CRT(I3*),Q770	
4		E4208419862	PCBA CRT(A6*),Q770	
5		E4208419852	PCBA CRT(A5*),Q770	
6		E4208419842	PCBA CRT(A4*),Q770	
7	BC01	3540200058	BD-FER,BFS3550	
8	BC02	3540200059	BD-FER,BFS3580	
9	CC01	2131040020	CAP-MULT,0.1UF 50V Z AXI	
10	CC02	2131040020	CAP-MULT,0.1UF 50V Z AXI	
11	CC03	2131040020	CAP-MULT,0.1UF 50V Z AXI	
12	CC05	2131040020	CAP-MULT,0.1UF 50V Z AXI	
13	CC07	2131040020	CAP-MULT,0.1UF 50V Z AXI	
14	CC08	2131040020	CAP-MULT,0.1UF 50V Z AXI	
15	CC10	2131040020	CAP-MULT,0.1UF 50V Z AXI	
16	DC01	DT1N4148	DIODE,1N4148 TAPING	
17	DC02	DT1N4148	DIODE,1N4148 TAPING	
18	DC03	DT1N4148	DIODE,1N4148 TAPING	
19	DC04	DT1N4148	DIODE,1N4148 TAPING	
20	DC05	DT1N4148	DIODE,1N4148 TAPING	
21	DC06	DT1N4148	DIODE,1N4148 TAPING	
22	DC07	DTISS81	DIODE,SWITCHING ISS81	
23	DC08	DTISS81	DIODE,SWITCHING ISS81	
24	DC09	DTISS81	DIODE,SWITCHING ISS81	
25	DC10	DTISS81	DIODE,SWITCHING ISS81	
26	DC11	DTISS81	DIODE,SWITCHING ISS81	
27	DC12	DTISS81	DIODE,SWITCHING ISS81	
28	DC13	DTISS81	DIODE,SWITCHING ISS81	
29	DC14	DTISS81	DIODE,SWITCHING ISS81	
30	DC15	DTISS81	DIODE,SWITCHING ISS81	
31	JC01	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
32	JC02	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
33	JC03	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
34	JC04 0001	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
35	JC07	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
36	JC08	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
37	JC10	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
38	JC11	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
39	JC12	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
40	JC13	375300002401	WIRE-NS-S43MM TAP. SDA 1/	
41	LC01	3500101860	INDUCT-FIX,AL04TBR47K K A	
42	LC02	3500101860	INDUCT-FIX,AL04TBR47K K A	
43	LC03	3500101860	INDUCT-FIX,AL04TBR47K K A	
44	LC04	3500101860	INDUCT-FIX,AL04TBR47K K A	
45	LC05	3500101860	INDUCT-FIX,AL04TBR47K K A	
46	LC06	3500101860	INDUCT-FIX,AL04TBR47K K A	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
47	RC01	RD-8P0T0750J	RES-CF,RD 1/8W 75 OHM J	
48	RC02	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
49	RC03	RD-8P0T0750J	RES-CF,RD 1/8W 75 OHM J	
50	RC04	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
51	RC05	RD-8P0T0750J	RES-CF,RD 1/8W 75 OHM J	
52	RC06	RD-8P0T0330J	RES-CF,RD 1/8W 33 OHM J	
53	RC07	2466808004	RES-MOF,6.8 1W J M	
54	RC08	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
55	RC09	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
56	RC10	RD-8P0T0331J	RES-CF,RD 1/8W 330 OHM J	
57	RC11	RD-8P0T0102J	RES-CF,RD 1/8W 1K OHM J	
58	RC12	RD-8P0T0223J	RES-CF,RD 1/8W 22K OHM J	
59	RC13	RD-8P0T0472J	RES-CF,RD 1/8W 4.7K OHM J	
60	RC14	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
61	RC26	RD-4P0T0820J	RES-CF,RD 1/4W 82 OHM J	
62	RC27	RD-4P0T0820J	RES-CF,RD 1/4W 82 OHM J	
63	RC28	RD-4P0T0820J	RES-CF,RD 1/4W 82 OHM J	
64	RC29	2403309005	RES-CF,33 0.5W J M	
65	RC30	2403309005	RES-CF,33 0.5W J M	
66	RC31	2403309005	RES-CF,33 0.5W J M	
67	RC33	RD-8P0T0824J	RES-CF,RD 1/8W 820K OHM J	
68	RC34	RD-8P0T0824J	RES-CF,RD 1/8W 820K OHM J	
69	RC35	RD-8P0T0824J	RES-CF,RD 1/8W 820K OHM J	
70	RC37	2401000008	RES-CF,100 0.5W J M	
71	RC38	RD-4P0T0102J	RES-CF,RD 1/4W 1K OHM J	
72	RC39	RD-4P0T0102J	RES-CF,RD 1/4W 1K OHM J	
73	RC40	RD-4P0T0102J	RES-CF,RD 1/4W 1K OHM J	
74	CC04	CE04BT1C221M	CAP-EL,SMS 16V 220UF M	
75	CC06	CC45CT1H220J	CAP-CD,50V 22PF J	
76	CC09	CE04BT1C101M	CAP-EL,SMS 16V 100UF M	
77	CC11	CQ92BT2A104J	CAP-PE,100V 0.1UF J	
78	CC12	CE04BT2A470M	CAP-EL,SMS 100V 47UF M	
79	CC13	2001090053	CAP-AL,1UF 100V M 5*11 NP	
80	CC14	2001090053	CAP-AL,1UF 100V M 5*11 NP	
81	CC15	2001090053	CAP-AL,1UF 100V M 5*11 NP	
82	CC16	CE04BT1C470M	CAP-EL,SMS 16V 47UF M	
83	CC17	CK45BN2H102K	CAP-CD,500V 1000PF K	
84	CC19	2002280012	CAP-AL,0.22UF 160V M 5*11	
85	CC20	2002280012	CAP-AL,0.22UF 160V M 5*11	
86	CC21	2002280012	CAP-AL,0.22UF 160V M 5*11	
87	CC22	CE04BT2C100M	CAP-EL,SMS 160V 10UF M	
88	CC23	CE04BT1HR22M	CAP-EL,SMS 50V 0.22UF M	
89	CC24	2141040020	CAP-M-P,0.1UF 250V J RAD	
90	RC32	246100800601	RES-MOF,1 1W J R-FORMING	
91	RC36	246220500101	RES-MOF,22M 1W R-FORMING	
92	SGC01	3411100083	VARISTOR,SURGE ABSORBER R	
93	SGC02	3411100083	VARISTOR,SURGE ABSORBER R	
94	SGC03	3411100083	VARISTOR,SURGE ABSORBER R	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
95	SGC04	3411100084	VARISTOR,SURGE ABSORBER R	
96	SGC05	3411100043	VARISTOR,S23 1500V 1500V	
97	CGND	372010105301	CONN-M,POST 1P DEGT235 14	
98	ICC03	M11143008012	SCREW,BIN(+) M3*8 MSZPC	
99	ICC03	3200001527	IC-LIN,LM2467 T02	
100	ICC03	6124036603	H-SINK V,Q770	
101	CC18	2102230017	CAP-CER,0.022UF 1KV J Z4U	
102	CNC01	3720101978	CONN-M,SMW200-15 15	
103	CNC02	3720101388	CONN-M,SMW200-06P	
104	G2	375500076908	WIRE-ASS'Y,G2 180MM Q770	
105	ICC01	3200001526	IC-LIN,LM1267 DIP	
106	ICC04	3200001528	IC-LIN,LM2479 DIP	
107	SK01	3721101187	CONN-F,CRT SKT ISDW01S P9	

KEY BOARD

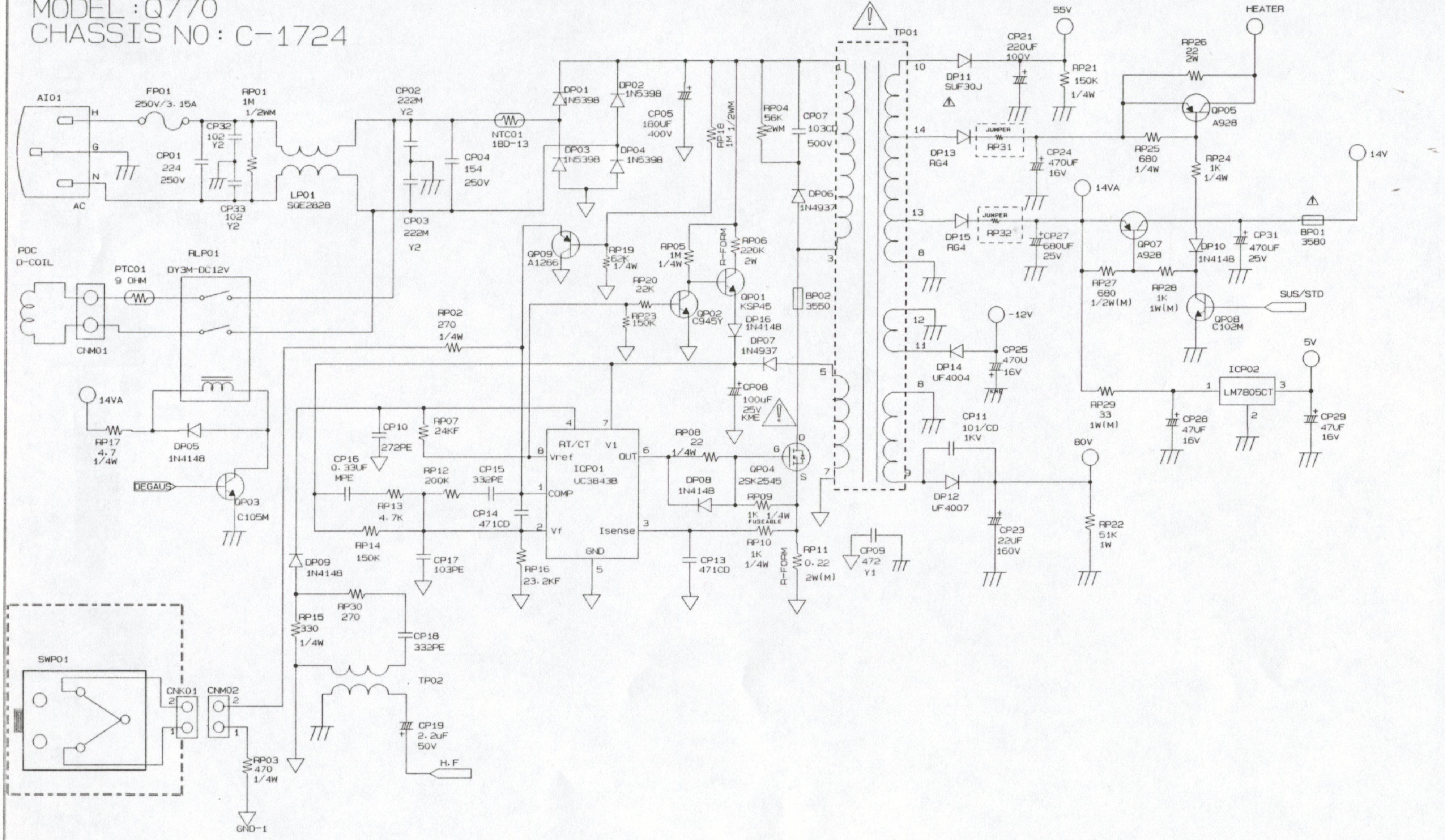
NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
1		E4208519803	PCBA KEY(I1*),Q770	
2		E4208819803	PCBA KEY(I2*),Q770	
3		E4208419853	PCBA KEY(A5*),Q770	
4		E4208419843	PCBA KEY(A4*),Q770	
5	RK01	RN-4P0T1742F	RES-MF,RN 1/4W 17.4KOHM F	
6	RK02	RD-8P0T0752J	RES-CF,RD 1/8W 7.5K OHM J	
7	RK03	RD-4P0T0103J	RES-CF,RD 1/4W 10K OHM J	
8	RK04	RD-4P0T0331J	RES-CF,RD 1/4W 330 OHM J	
9	RK05	RD-8P0T0103J	RES-CF,RD 1/8W 10KOHM J	
10	RK06	RD-8P0T0332J	RES-CF,RD 1/8W 3.3K OHM J	
11	SW01	E42027039010	SWITCH TACT,5MM 160GF VER	
12	SW02	E42027039010	SWITCH TACT,5MM 160GF VER	
13	SW03	E42027039010	SWITCH TACT,5MM 160GF VER	
14	SW04	E42027039010	SWITCH TACT,5MM 160GF VER	
15	CNK01	372010139601	CONN-M,SMAW250-02	
16	CNK02	372010138701	CONN-M,SMAW200-05P	
17	LED01	3330600441	LED,A1329B/GYC/R2	
18	SWP01	3700800117	SW-PUSH,CPS-1202 30V 0.3A	

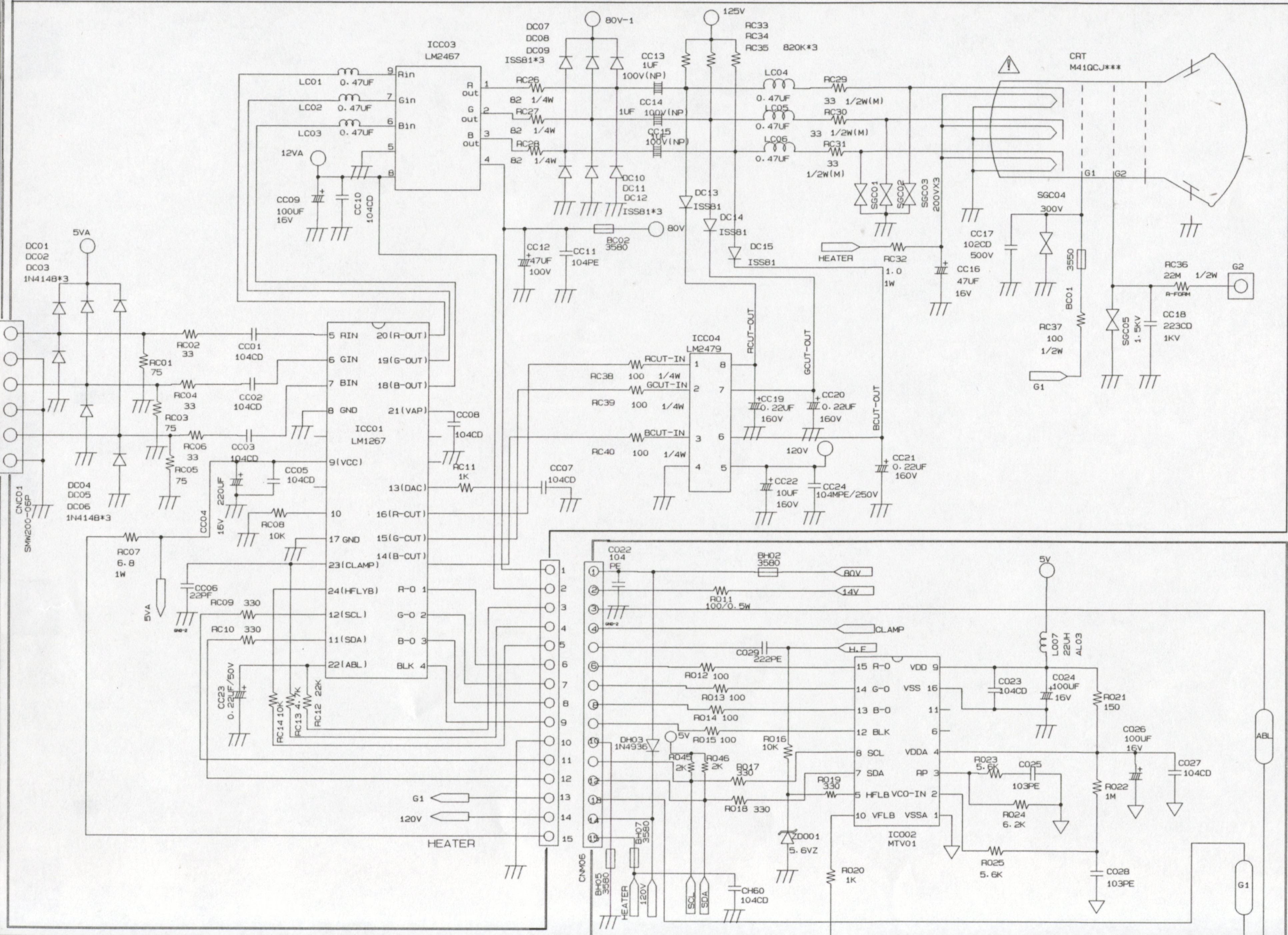
Miscellaneous

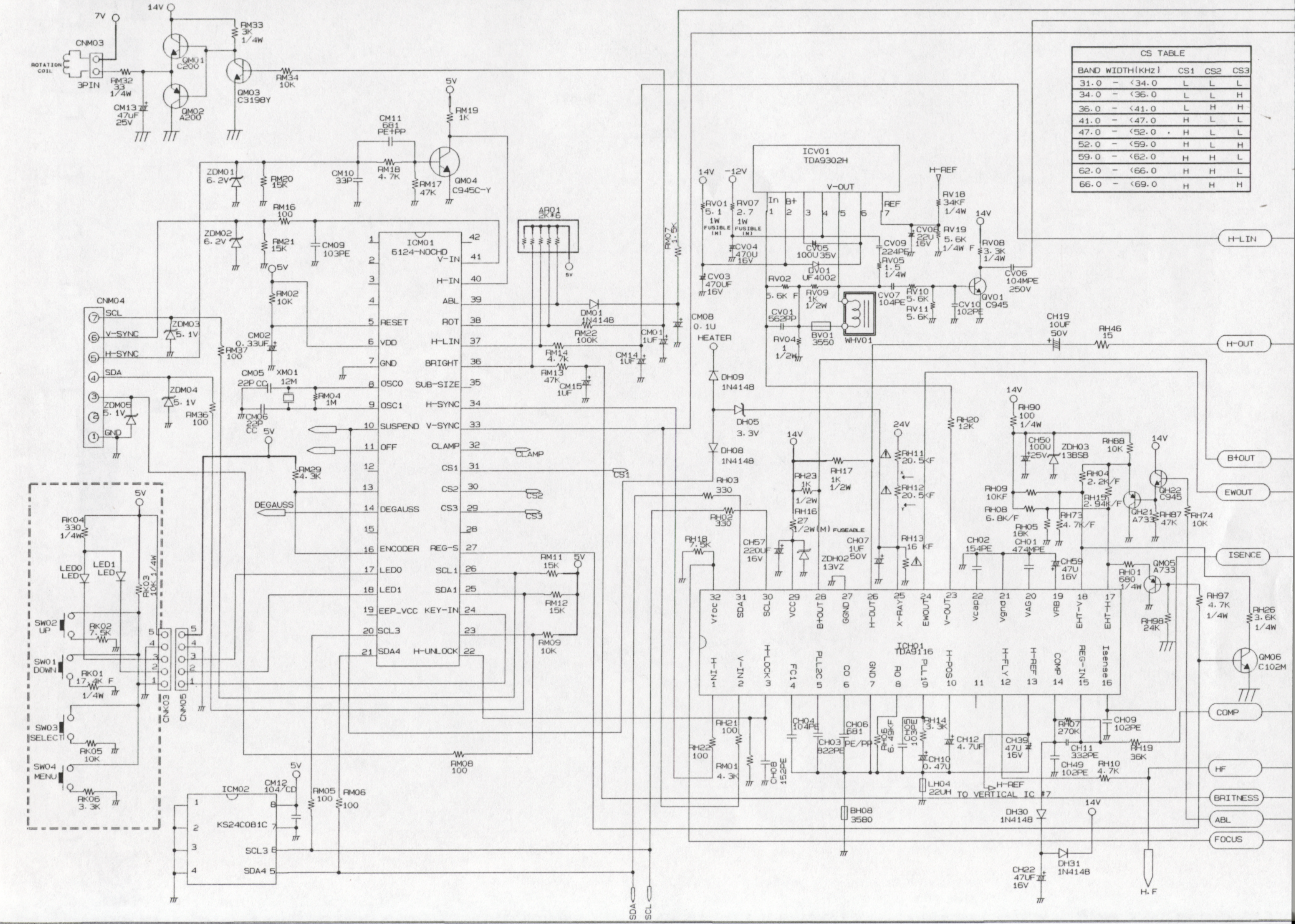
NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
1		B4209531701A	BAG PE(SET)	
2		6201296000	BASE SWIVEL,Q770	
3		B4008500100A	CABLE TIE	
4		B4008500100A	CABLE TIE	
5		6201296200	CAP GATE,Q770	
6		3758000200	CBL-PWR,MW WALL 1.8MT EUR	
7		3758500454	CBL-SGN,Q770 ATTACH 1530M	
8		6320230211	CD MNAUAL IQT ALL	
9		6101218200	CHASSIS MAIN ASSY,Q770	
10		6101218100	CHASSIS MASIN,Q770	
11		6223076900	CLAMP,MOUNT BASE V770 ELO	
12		6155037600	COIL-SP,SPRING Q770	
13		3725005200	CONN-A,15P CBL 150MM Q770	
14		3725005198	CONN-A,2P CBL 300MM Q770	
15		3725005199	CONN-A,5P CBL 230MM Q770/	
16		6120051500	CONTACT-PL BOTTOM ASSY,Q7	
17		6120050700	CONTACT-PLTE,Q770	
18		6201298000	COVER BOTTOM ASSY,Q770	
19		6201295800	COVER BOTTOM,Q770	
20		6201295900	COVER CAP,Q770	
21		6201297900	COVER TOP ASSY,Q770	
22		6201295700	COVER TOP,Q770	
23		3010100158	CRT,M41QCJ761X173 FLAT	⚠
24		6262005000	FOOTER,RUBBER BOTTOM,Q770	
25		6262005100	FOOTER,RUBBER PLATE,Q770	
26		6120051100	GND-PL,GROUND CRT LEFT,Q7	
27		6120050400	GND-PL,GROUND CRT RIGHT,Q	
28		6120030100	GND-PL,SRTING T5870C	
29		3500101855	INDUCT-FIX,Q770 K IH 18UH	
30		6225033000	INSULATION ANODE,Q770	
31		6225033100	INSULATION CRT,Q770	
32		B4210328101	KIT COVER,Q770 IQT	
33		B4204665800	KIT LABEL,Q770/99 CD IQT	
34		6215237000	KNOB POWER,Q770	
35		6215237100	KNOB V/R,Q770	
36		6316345220	LABEL BACK,Q770 IQT	
37		B4204513263B	LABEL,B/CODE 64KHZ(DIC21)	
38		B4204505100C	LABEL,X-RAY WARNING	
39		6220084900	LED LENS POWER,Q770	
40		E4205017601	MAIN ASSY,Q770 EXP	
41		E4208719801	PCB ASSY,Q770 EXP	
42		M17744006012	SCREW,BIN(+) M4*6 MSZPC	
43		5004000204	SCR-TT,BIN + MC 3*8	
44		6327035203	SHEET INSTALL GUIDE,IQT A	
45		6120050200	SHIELD COVER,Q770	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
46		6120042800	SHIELD GROUND SPRING,V770	
47		6120042800	SHIELD GROUND SPRING,V770	
48		6120050800	SHLD-CASE COVER ASSY,Q770	
49		6120050900	SHLD-CASE,F/SHLD CRT ASY,	
50		6120050300	SHLD-CASE,SHIELD PLATE Q7	
51		6120050100	SHLD-PL,FENCE SHIELD CRT	
52		6316345101	STICKER CABINET,TCO '99	
53		6201298100	SWIVEL ASSY,Q770	
54		6201300100	TILT&SWIVEL ASSY,Q770	
55		375500078906	WIRE-ASS'Y,COPPER ASSY Q7	

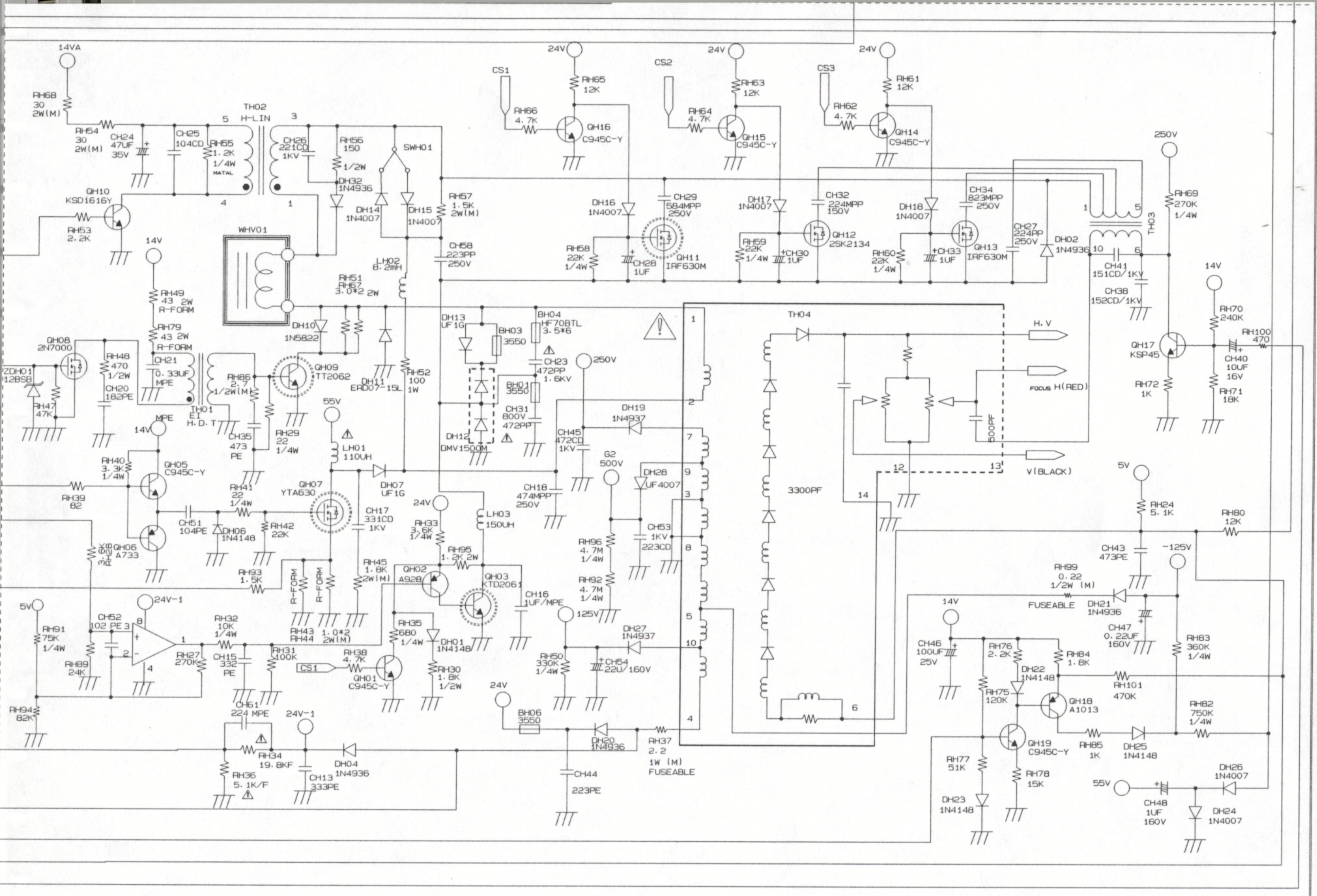
MODEL : Q770
CHASSIS NO : C-1724


AI01
H
G
N
AC
FP01
250V/3.15A
RP01
1M
1/2WM
CP32
102
Y2
CP01
224
250V
CP33
102
Y2
LP01
SQE2828
CP02
222M
Y2
CP03
222M
Y2
CP04
154
250V
NTC01
18D-13
DP01
1N5398
DP02
1N5398
DP03
1N5398
DP04
1N5398
CP05
180UF
400V
RP18
1M 1/2WM
RP04
56K
2WM
CP07
103CD
500V
DP06
1N4937
TP01
1
3
5
7
9
10
14
13
8
12
11
8
DP11
SUF30J
CP21
220UF
100V
55V
RP21
150K
1/4W
DP13
RG4
JUMPER
RP31
CP24
470UF
16V
DP15
RG4
JUMPER
RP32
CP27
680UF
25V
HEATER
RP26
22
2W
QP05
A928
RP25
680
1/4W
RP24
1K
1/4W
14V
14VA
QP07
A928
DP10
1N4148
CP31
470UF
25V
BP01
3580
RP27
680
1/2W(M)
RP28
1K
1W(M)
QP08
C102M
SUS/STD
-12V
DP14
UF4004
CP25
470U
16V
KME
5V
ICP02
LM7805CT
1
2
3
RP29
33
1W(M)
CP28
47UF
16V
CP29
47UF
16V
CP11
101/CD
1KV
80V
DP12
UF4007
CP23
22UF
160V
RP22
51K
1W
PDC
D-COIL
PTC01
9 OHM
CNM01
RLP01
DY3M-DC12V
QP09
A1266
RP19
62K
1/4W
RP05
1M
1/4W
R-FORM
RP06
220K
2W
RP20
22K
RP23
150K
QP02
C945Y
QP01
KSP45
DP16
1N4148
DP07
1N4937
BP02
3550
CP08
100uF
25V
KME
RP02
270
1/4W
14VA
RP17
4.7
1/4W
DP05
1N4148
DEGAUS
QP03
C105M
CP10
272PE
RP07
24KF
CP16
0.33UF
MPE
RP12
200K
CP15
332PE
RP13
4.7K
CP14
471CD
RP14
150K
CP17
103PE
RP16
23.2KF
ICP01
UC3843B
RT/CT
V1
Vref
OUT
COMP
Vf
Isense
GND
4
7
8
6
1
2
3
5
RP08
22
1/4W
QP04
2SK2545
D
G
S
DP08
1N4148
RP09
1K 1/4W
FUSEABLE
RP10
1K
1/4W
CP13
471CD
RP11
0.22
2W(M)
R-FORM
CP09
472
Y1
DP09
1N4148
RP15
330
1/4W
RP30
270
CP18
332PE
TP02
CP19
2.2uF
50V
H.F
SWP01
CNK01
CNM02
2
1
2
1
RP03
470
1/4W
GND-1


ICC03
LM2467
LC01 0.47UF
LC02 0.47UF
LC03 0.47UF
Rin
Gin
Bin
R out
G out
B out
12VA
CC09 100UF 16V
CC10 104CD
DC07 DC08 DC09 ISS81*3
80V-1
125V
RC26 82 1/4W
RC27 82 1/4W
RC28 82 1/4W
DC10 DC11 DC12 ISS81*3
CC13 1UF 100V(NP)
CC14 1UF 100V(NP)
CC15 100V(NP)
RC33 RC34 RC35 820K*3
LC04 0.47UF
LC05 0.47UF
LC06 0.47UF
RC29 33 1/2W(M)
RC30 33 1/2W(M)
RC31 33 1/2W(M)
SGC01 SGC02 SGC03 200VX3
CRT M41QCJ***
G1 G2
SGC04 300V
CC12 47UF 100V
CC11 104PE
BC02 3580
80V
DC13 ISS81
DC14 ISS81
DC15 ISS81
HEATER
RC32 1.0 1W
CC16 47UF 16V
CC17 102CD 500V
BC01 3550
RC37 100 1/2W
RC36 22M 1/2W R-FORM
G2
SGC05 1.5KV
CC18 223CD 1KV
G1
5VA
DC01 DC02 DC03 1N4148*3
CNC01 SMW200-06P
RC02 33
RC01 75
RC04 33
RC03 75
RC06 33
RC05 75
CC01 104CD
CC02 104CD
CC03 104CD
DC04 DC05 DC06 1N4148*3
ICC01 LM1267
5 RIN
6 GIN
7 BIN
8 GND
9(VCC)
10
17 GND
23(CLAMP)
24(HFLYB)
12(SCL)
11(SDA)
22(ABL)
20(R-OUT)
19(G-OUT)
18(B-OUT)
21(VAP)
13(DAC)
16(R-CUT)
15(G-CUT)
14(B-CUT)
R-O 1
G-O 2
B-O 3
BLK 4
CC08 104CD
CC05 104CD
CC04 220UF 16V
RC11 1K
CC07 104CD
RC08 10K
RC07 6.8 1W
5VA
CC06 22PF
RC09 330
RC10 330
CC23 0.22UF/50V
RC14 10K
RC13 4.7K
RC12 22K
G1
120V
HEATER
ICC04 LM2479
RCUT-IN
GCUT-IN
BCUT-IN
RC38 100 1/4W
RC39 100 1/4W
RC40 100 1/4W
RCUT-OUT
GCUT-OUT
BCUT-OUT
CC19 0.22UF 160V
CC20 0.22UF 160V
120V
CC21 0.22UF 160V
CC22 10UF 160V
CC24 104MPE/250V
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
CN006
CC022 104 PE
BH02 3580
80V
14V
R011 100/0.5W
CLAMP
C029 222PE
H.F
R012 100
R013 100
R014 100
R015 100
DH03 1N4936
5V
R045 2K
R046 2K
R016 10K
R017 330
R018 330
R019 330
ZD001 5.6VZ
R020 1K
BH05 3580
BH07 3580
HEATER
120V
SCL
SDA
CH60 104CD
5V
L007 22UH AL03
15 R-O
14 G-O
13 B-O
12 BLK
8 SCL
7 SDA
5 HFLB
10 VFLB
VDD 9
VSS 16
11
6
VDDA 4
RP 3
VCO-IN 2
VSSA 1
IC002 MTV01
C023 104CD
C024 100UF 16V
R021 150
R023 5.6K
C025 103PE
R024 6.2K
R025 5.6K
C028 103PE
R022 1M
C026 100UF 16V
C027 104CD
ABL
G1


7V
14V
CNM03
ROTATION COIL
3PIN
RM32 33 1/4W
CM13 47uF 25V
QM01 C200
QM02 A200
RM33 3K 1/4W
QM03 C3198Y
RM34 10K
5V
RM19 1K
CM11 681 PE+PP
CM10 33P
RM18 4.7K
RM17 47K
QM04 C945C-Y
ZDM01 6.2V
RM20 15K
RM16 100
ZDM02 6.2V
RM21 15K
CM09 103PE
RM02 10K
CNM04
SCL
V-SYNC
H-SYNC
SDA
GND
ZDM03 5.1V
ZDM04 5.1V
ZDM05 5.1V
RM37 100
RM36 100
CM02 0.33UF
CM05 22P CC
XM01 12M
RM04 1M
CM06 22P CC
ICM01 6124-NOCHD
1 2 3 4 5 RESET 6 VDD 7 GND 8 OSCO 9 OSC1 10 SUSPEND 11 OFF 12 13 14 DEGAUSS 15 16 ENCODER 17 LED0 18 LED1 19 EEP_VCC 20 SCL3 21 SDA4
42 41 V-IN 40 H-IN 39 ABL 38 ROT 37 H-LIN 36 BRIGHT 35 SUB-SIZE 34 H-SYNC 33 V-SYNC 32 CLAMP 31 CS1 30 CS2 29 CS3 28 27 REG-S 26 SCL1 25 SDA1 24 KEY-IN 23 22 H-UNLOCK
AR01 2K*6
RM07 1.5K
DM01 1N4148
RM22 100K
RM14 4.7K
RM13 47K
CM15 1UF
CM14 1UF
CM01 1UF
CM08 0.1U
RM29 4.3K
CLAMP
CS1
CS2
CS3
DEGAUSS
RM11 15K
RM12 15K
RM09 10K
RK04 330 1/4W
LED0 LED
LED1 LED
RK03 10K 1/4W
SW02 UP
RK02 7.5K
SW01 DOWN
RK01 17.4K F 1/4W
SW03 SELECT
RK05 10K
SW04 MENU
RK06 3.3K
CNK03
CNM05
RM08 100
ICM02 KS24C081C
CM12 104/CD
RM05 100
RM06 100
SCL3
SDA4
SDA
SCL
ICV01 TDA9302H
V-OUT
In B+ REF
H-REF
RV18 34KF 1/4W
RV19 5.6K 1/4W F
14V
-12V
RV01 5.1 1W FUSIBLE (M)
RV07 2.7 1W FUSIBLE (M)
CV04 470U 16V
CV05 100U 35V
DV01 UF4002
CV08 22U 16V
CV09 224PE
RV05 1.5 1/4W
RV08 3.3K 1/4W
CV06 104MPE 250V
CV03 470UF 16V
RV02 5.6K F
RV09 1K 1/2W
CV07 104PE
RV10 5.6K
RV11 5.6K
CV10 102PE
QV01 C945
CV01 562PP
RV04 1 1/2W
BV01 3550
WHV01
HEATER
DH09 1N4148
DH05 3.3V
DH08 1N4148
CH19 10UF 50V
RH46 15
RH20 12K
RH90 100 1/4W
CH50 100U 25V
ZDH03 13BSB
RH88 10K
RH04 2.2K/F
RH15 2.94K/F
QH21 A733
QH22 C945
RH87 47K
RH74 10K
RH09 10KF
RH08 6.8K/F
RH05 18K
RH73 4.7K/F
24V
RH11 20.5KF
RH12 20.5KF
RH13 16 KF
RH23 1K 1/2W
RH17 1K 1/2W
RH16 27 1/2W(M) FUSEABLE
RH03 330
RH02 330
RH18 7.5K
CH57 220UF 16V
ZDH02 13VZ
CH07 1UF 50V
CH02 154PE
CH01 474MPE
CH59 47U 16V
RH01 680 1/4W
QM05 A733
RH98 24K
RH97 4.7K 1/4W
RH26 3.6K 1/4W
QM06 C102M
ICH01 TDA9116
32 Vfoc 31 SDA 30 SCL 29 VCC 28 B+OUT 27 GGND 26 H-OUT 25 X-RAY 24 EWOUT 23 V-OUT 22 Vcap 21 Vgnd 20 VAG 19 VAB 18 EHT-V 17 EHT-H
1 H-IN 2 V-IN 3 H-LOCK 4 FC1 5 PLL2C 6 C0 7 GND 8 R0 9 PLL1F 10 H-POS 11 12 H-FLY 13 H-REF 14 COMP 15 REG-IN 16 Isense
RH21 100
RH22 100
RM01 4.3K
CH08 152PE
CH04 104PE
CH03 822PE
CH06 681 PE/PP
RH06 6.49KF
CH05 103PE
RH14 3.3K
CH12 4.7UF
CH10 0.47U
LH04 22UH
BH08 3580
CH39 47U 16V
RH07 270K
CH11 332PE
CH49 102PE
RH10 4.7K
CH09 102PE
RH19 36K
H-REF TO VERTICAL IC #7
DH30 1N4148
DH31 1N4148
CH22 47UF 16V
H-LIN
H-OUT
B+OUT
EWOUT
ISENCE
COMP
HF
BRITNESS
ABL
FOCUS
H.F

CS TABLE					
BAND WIDTH(KHz)			CS1	CS2	CS3
31.0	-	<34.0	L	L	L
34.0	-	<36.0	L	L	H
36.0	-	<41.0	L	H	H
41.0	-	<47.0	H	L	L
47.0	-	<52.0	H	L	L
52.0	-	<59.0	H	L	H
59.0	-	<62.0	H	H	L
62.0	-	<66.0	H	H	L
66.0	-	<69.0	H	H	H


14VA
RH68 30 2W(M)
RH54 30 2W(M)
CH24 47UF 35V
CH25 104CD
RH65 1.2K 1/4W MATAL
TH02 H-LIN
CH26 221CD 1KV
RH56 150 1/2W
DH32 1N4936
SWH01
QH10 KSD1616Y
RH53 2.2K
WHV01
DH14 1N4007
DH15 1N4007
RH57 1.5K 2W(M)
CH58 223PP 250V
LH02 8.2mH
RH51 RH67 3.0*2 2W
24V
CS1
RH66 4.7K
QH16 C945C-Y
CS2
RH64 4.7K
RH63 12K
QH15 C945C-Y
CS3
RH62 4.7K
RH61 12K
QH14 C945C-Y
DH16 1N4007
CH29 584MPP 250V
QH11 IRF630M
RH58 22K 1/4W
CH28 1UF
DH17 1N4007
CH32 224MPP 150V
QH12 2SK2134
RH59 22K 1/4W
CH30 1UF
DH18 1N4007
CH34 823MPP 250V
QH13 IRF630M
RH60 22K 1/4W
CH33 1UF
CH27 224PP 250V
DH02 1N4936
TH03
CH41 151CD/1KV
CH38 152CD/1KV
250V
RH69 270K 1/4W
14V
RH70 240K
RH100 470
QH17 KSP45
CH40 10UF 16V
RH72 1K
RH71 18K
RH49 43 2W R-FORM
RH79 43 2W R-FORM
CH21 0.33UF MPE
CH20 182PE
QH08 2N7000
RH48 470 1/2W
ZDH01 12BSB
RH47 47K
TH01 E1 H.D.T
RH86 2.7 1/2W(M)
DH10 1N5822
QH09 TT2062
DH11 ERD07-15L
RH52 100 1W
DH13 UF1G
BH03 3550
BH04 HF70BTL 3.5*6
CH23 472PP 1.6KV
BH01 3550
CH31 800V 472PP
DH12 DMV1500M
TH04
H.V
FOCUS H(RED)
500PF
V(BLACK)
3300PF
MPE
14V
RH40 3.3K 1/4W
QH05 C945C-Y
RH39 82
CH35 473 PE
RH29 22 1/4W
55V
LH01 110UH
RH41 22 1/4W
QH07 YTA630
DH07 UF1G
CH51 104PE
DH06 1N4148
RH42 22K
CH17 331CD 1KV
QH06 A733
RH90 3.3K
LH03 150UH
DH19 1N4937
CH45 472CD 1KV
CH18 474MPP 250V
G2 500V
DH28 UF4007
CH53 1KV 223CD
RH96 4.7M 1/4W
RH92 4.7M 1/4W
RH93 1.5K
RH43 RH44 R-FORM
1.0*2 2W(M)
RH45 1.8K 2W(M)
RH33 3.6K 1/4W
RH95 1.2K 2W
QH02 A928
QH03 KTD2061
CH16 1UF/MPE
125V
DH27 1N4937
RH50 330K 1/4W
CH54 22U/160V
5V
RH91 75K 1/4W
CH52 102 PE
24V-1
RH32 10K 1/4W
RH27 270K
CH15 332 PE
RH31 100K
RH89 24K
RH94 82K
RH35 680 1/4W
DH01 1N4148
RH38 4.7K
QH01 C945C-Y
RH30 1.8K 1/2W
BH06 3550
DH20 1N4936
RH37 2.2 1W (M) FUSEABLE
CH44 223PE
CH61 224 MPE
RH34 19.8KF
RH36 5.1K/F
CH13 333PE
DH04 1N4936
5V
RH24 5.1K
RH80 12K
CH43 473PE
-125V
RH99 0.22 1/2W (M) FUSEABLE
DH21 1N4936
CH47 0.22UF 160V
RH83 360K 1/4W
CH46 100UF 25V
RH76 2.2K
RH84 1.8K
DH22 1N4148
RH101 470K
RH75 120K
QH18 A1013
RH82 750K 1/4W
QH19 C945C-Y
RH85 1K
DH25 1N4148
RH77 51K
RH78 15K
DH23 1N4148
55V
CH48 1UF 160V
DH26 1N4007
DH24 1N4007

WARNING: THIS EQUIPMENT CONTAINS SAFETY & CDRH CRITICAL COMPONENTS ALL PARTS SHOWN IN THE ⚠ MARKS OF THE SCHEMATIC ARE SAFETY REPLACE SAFETY CHITICAL COMPONENTS ONLY WITH MANUFACTURERS RECOMMENED PARTS LIST FOR EXACT REPLACEMENTS.

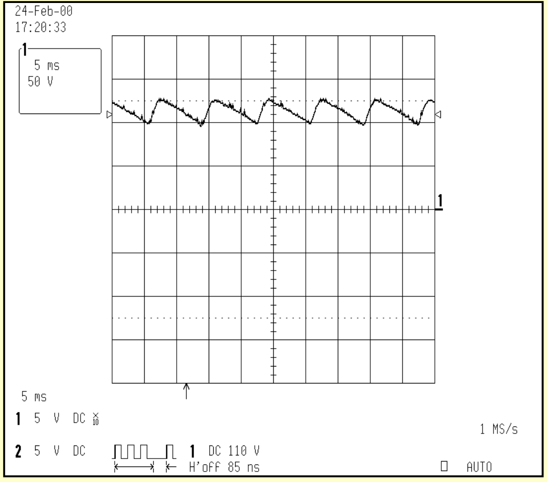
NOTE:
1. RESISTANCE IS SHOWN IN OHM K=1.000 M=1.000.000 RATED POWER OF RESISTOR NOT NOTED IN SCHEMATIC DIAGRAM IS 1/8W R-CARBON.
2. CAPACITANCE IS SHOWN pF AND NOTED CAPACITANCES IS SHOWN uF. uF=1.000.000pF RATED VOLTAGE OF CONDENCER NOT NOTED IN SCHEMATIC DIAGRAM IS 50V.
3. ABBREVIATION AND SYMBOL
P: POLYESTER PP: POLYPROPYLENE
4. THIS SCHEMATIC DIAGRAM IS SUBJECTED TO CHANGE WITHOUT NOTICE FOR FURTHER IMPROVEMENT.

DWG. REV.	REV01	DESCRIPTION		DOC. NO.	DATE	APPROVAL
DWG. NO.	E42045367	SIGNATURE		DATE	INSP	SHEET NO.
TITLE	Q770	DWN	Y. T. KIM	2001.06.01		1/1
		CHK	J. R. KIM	2001.06.01		
HYUNDAI ELECTRONICS		APP	Y. K BYUN	2001.06.01		

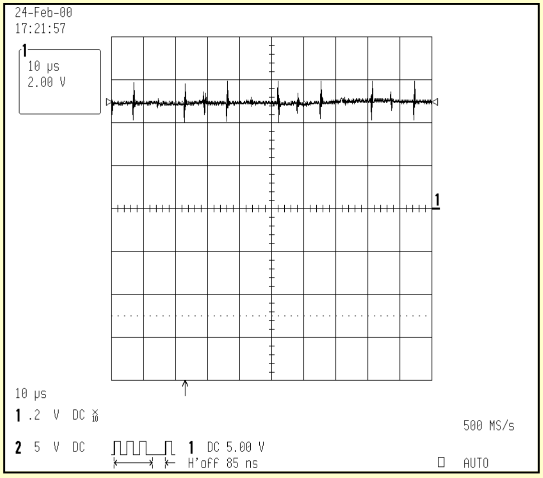
Wave Form

[1024X768@85Hz,Full White pattern]

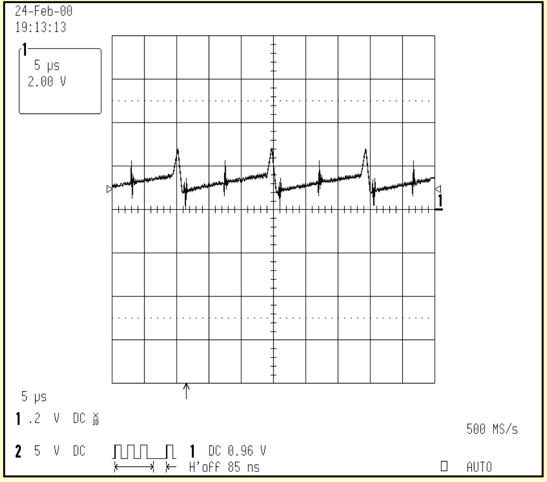
1.CP05 "+"



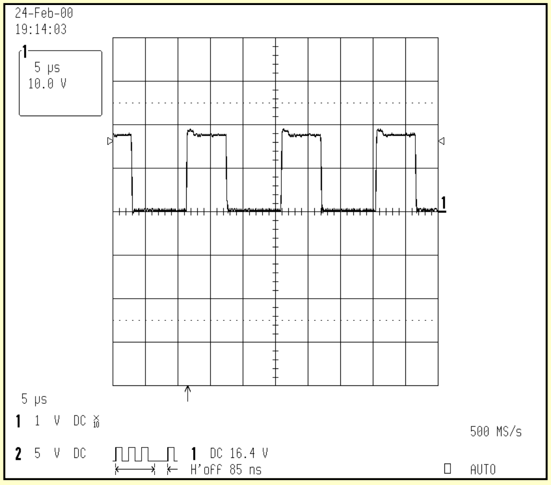
2.ICP01 PIN8



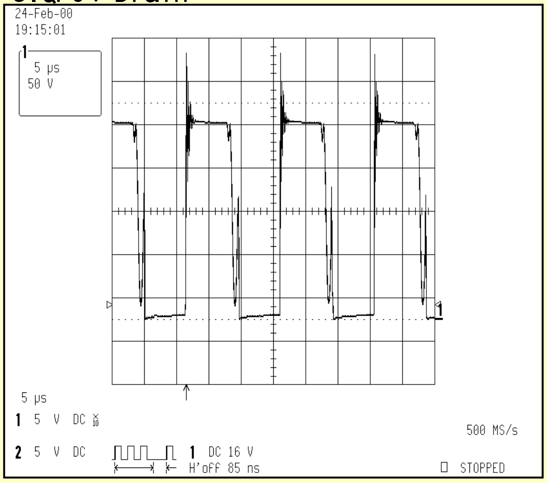
3.ICP01 PIN4



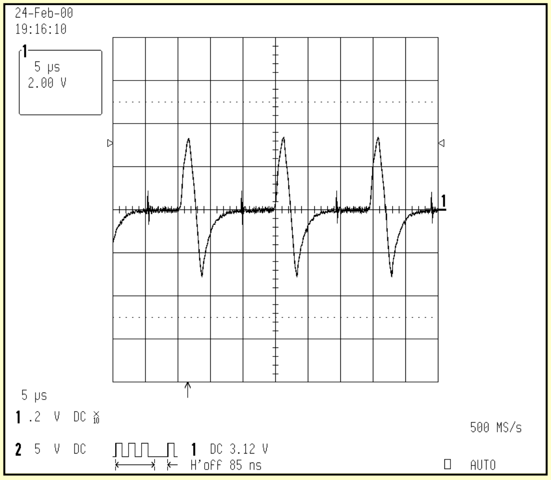
4.ICP01 PIN6



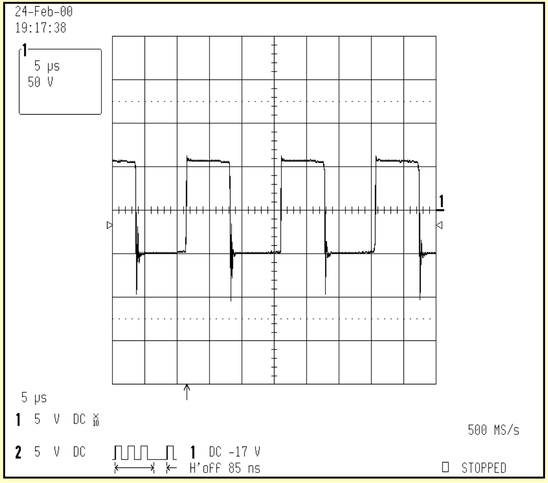
5.QP04 Drain



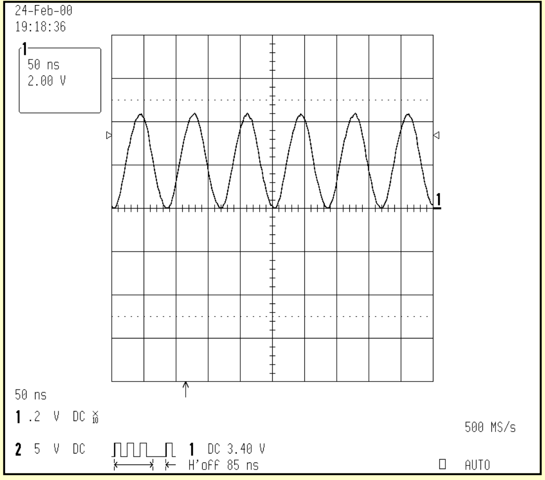
6.DP09 Anode



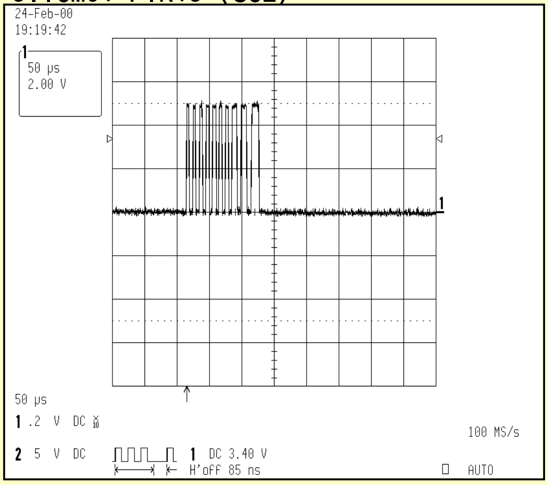
7.T101 PIN12



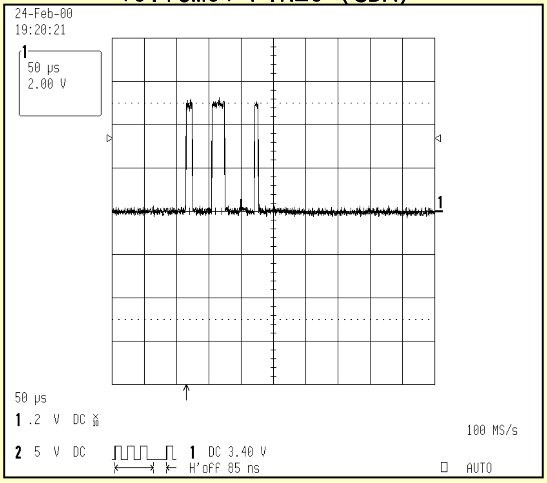
8.ICM01 PIN8



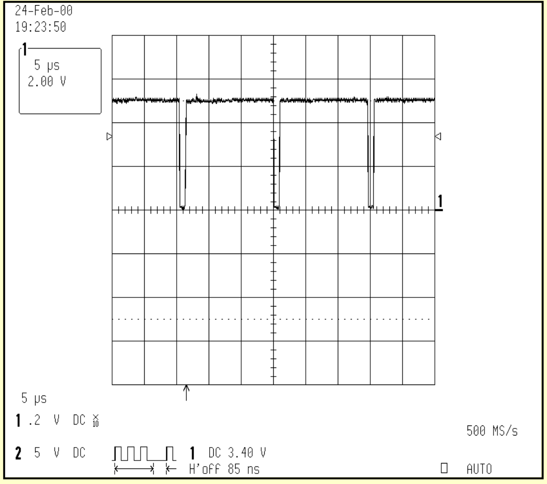
9.ICM01 PIN19 (SCL)



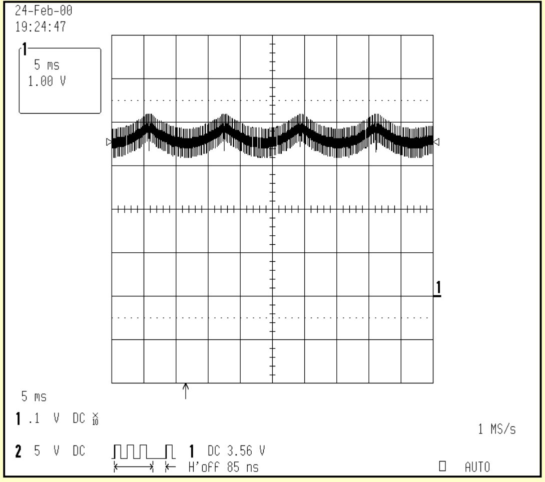
10.ICM01 PIN20 (SDA)



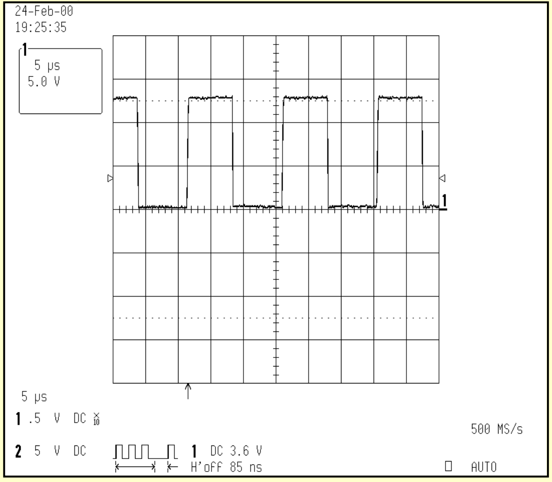
11.ICH01 PIN15



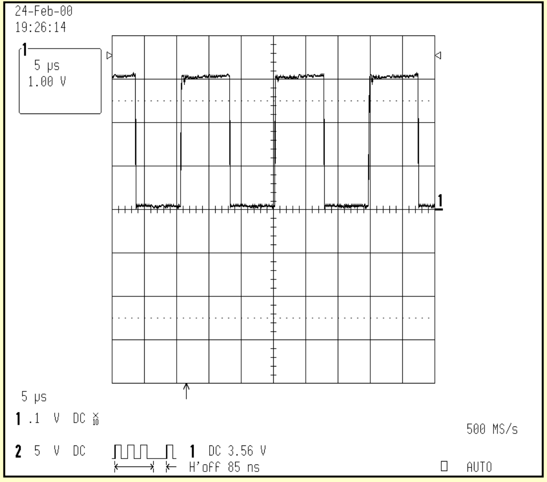
12.ICH01 PIN11



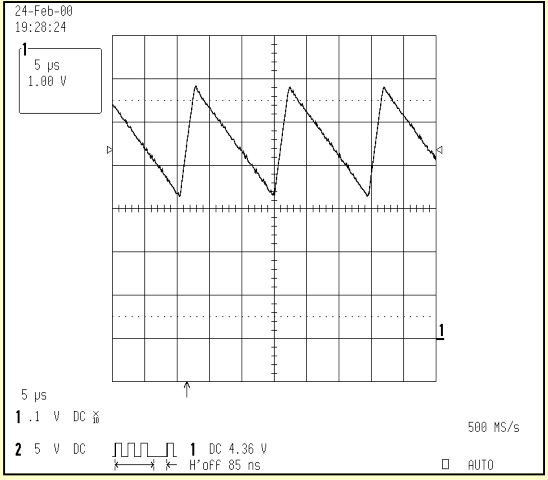
13.ICH01 PIN8



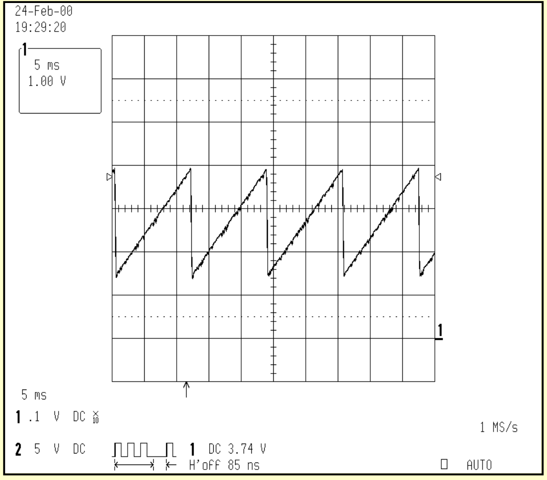
14.ICH01 PIN6



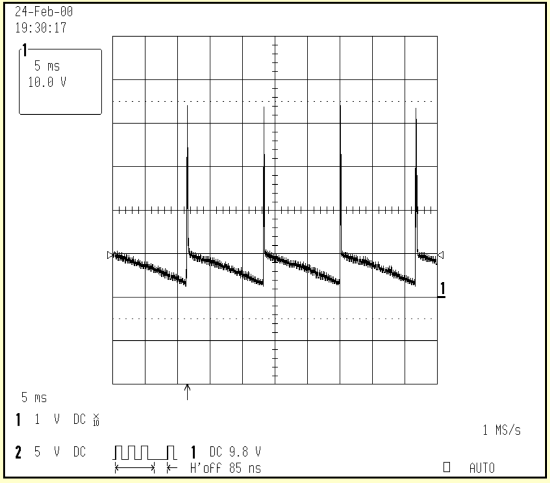
15.ICH01 PIN29



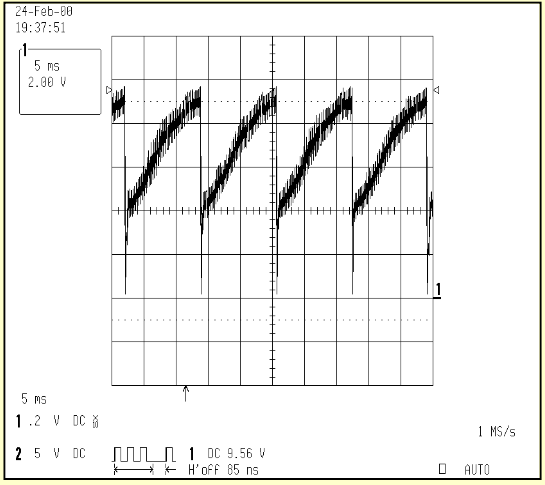
16.ICH01 PIN24



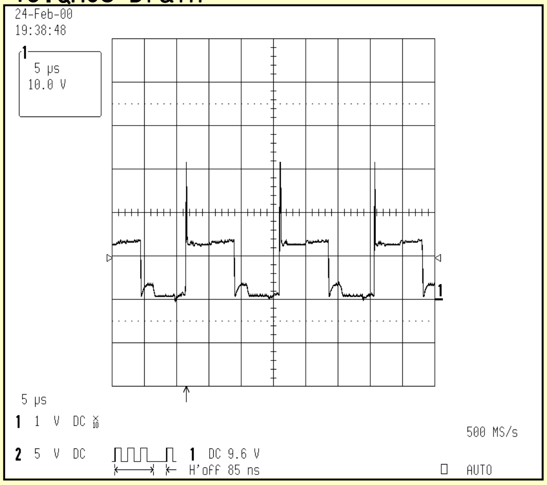
17.WHV01 PIN3



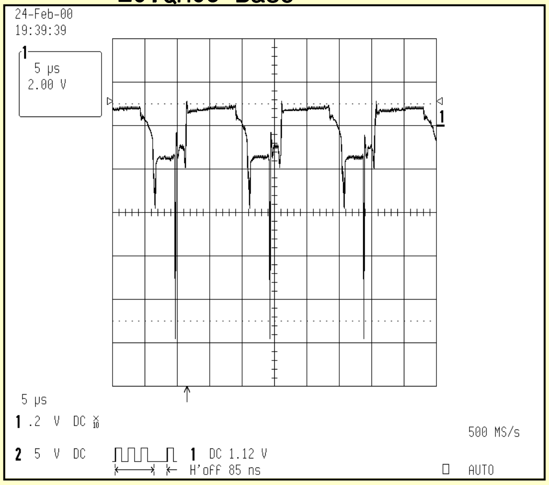
18.WHV01 PIN4



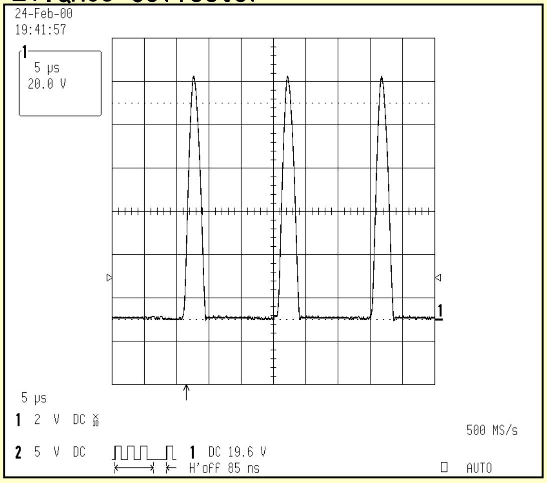
19.QH08 Drain



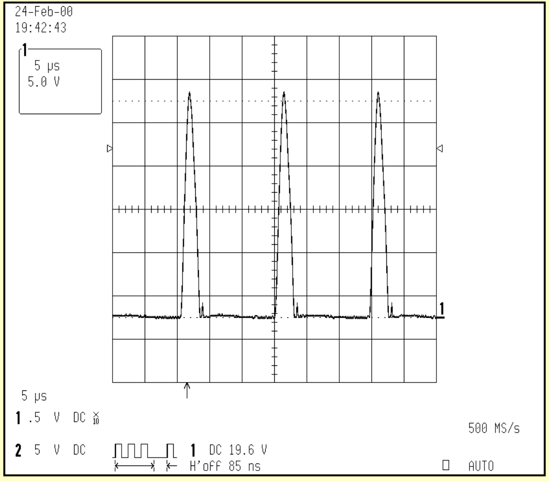
20.QH09 Base



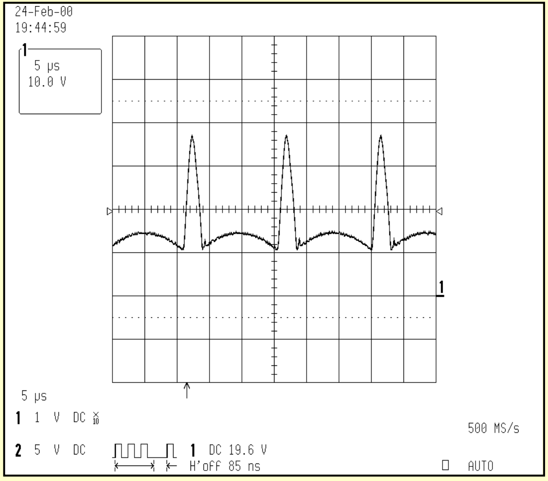
21.QH09 Collector



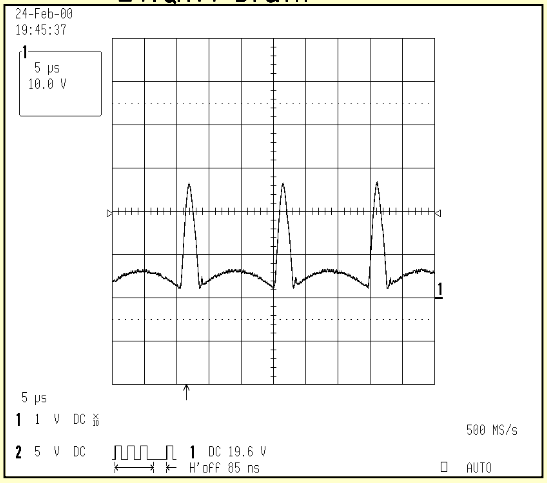
22.DH12 PIN2



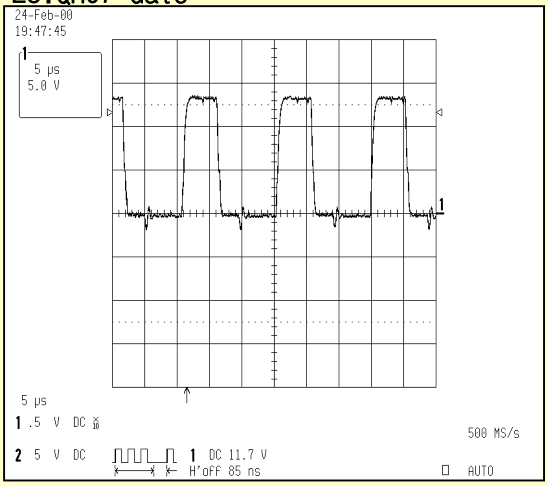
23.TH02 PIN1



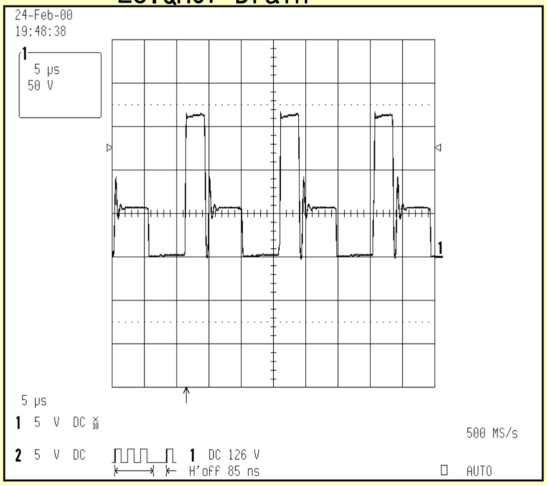
24.QH11 Drain



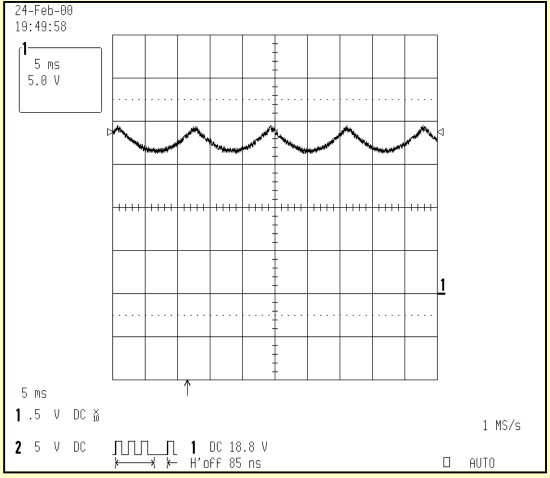
25.QH07 Gate



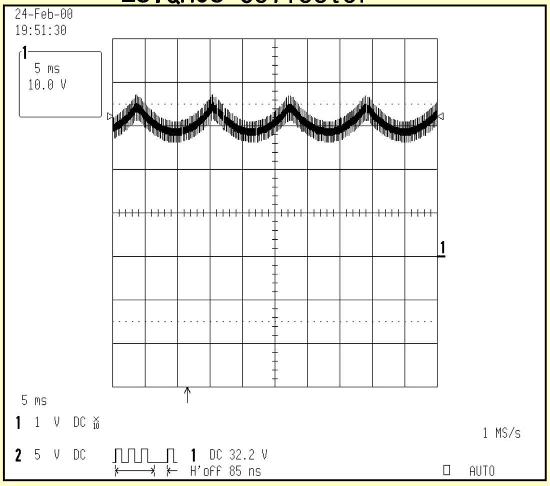
26.QH07 Drain



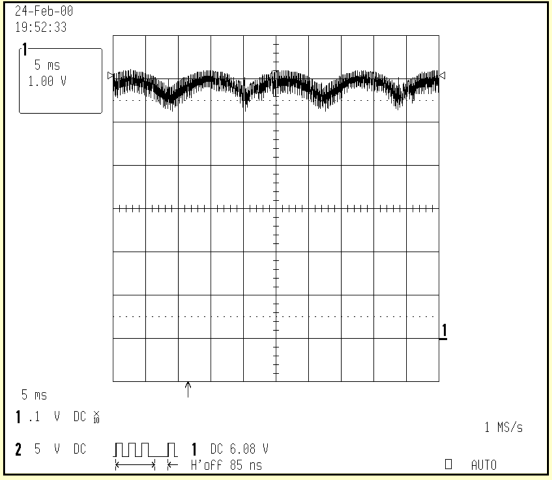
27.ICH02 PIN1



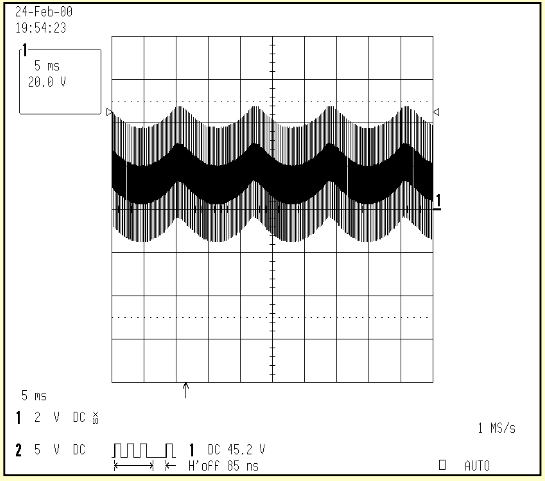
28.QH03 Collector



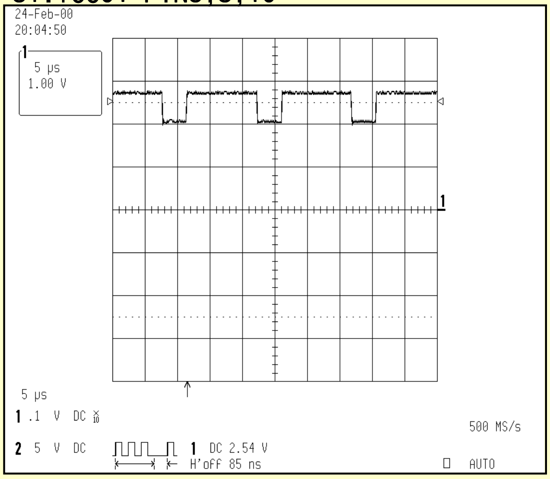
29.ICH01 PIN32



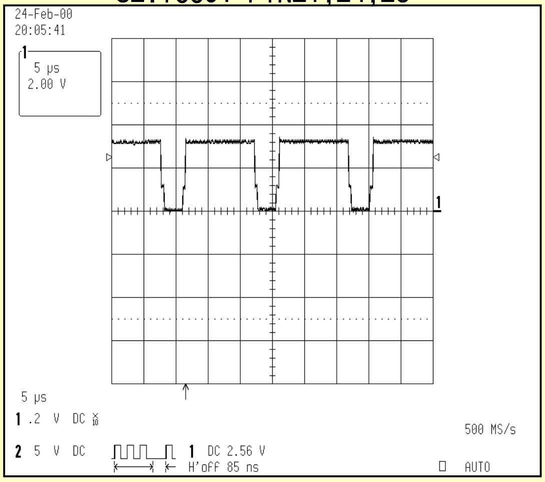
30.TH04 PIN12



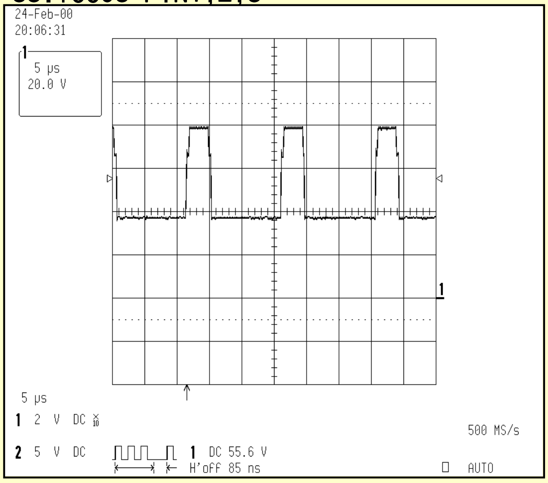
31.ICC01 PIN5,8,10



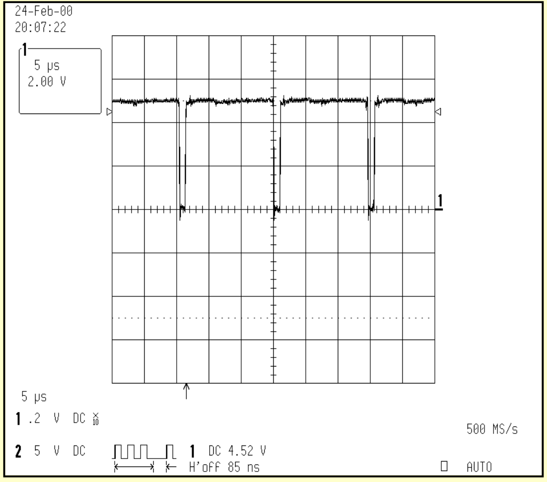
32.ICC01 PIN21,24,26



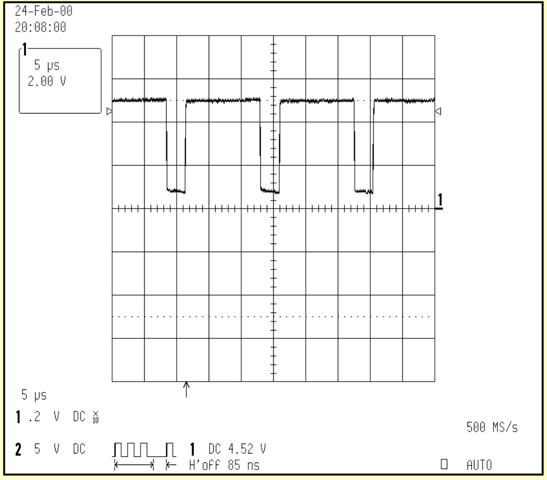
33.ICC03 PIN1,2,3



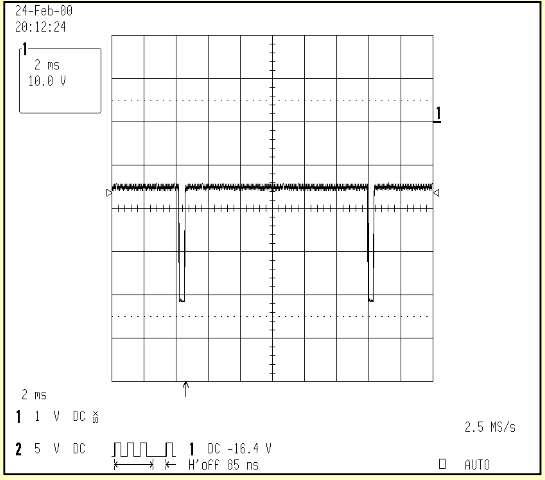
34.ICC01 PIN18

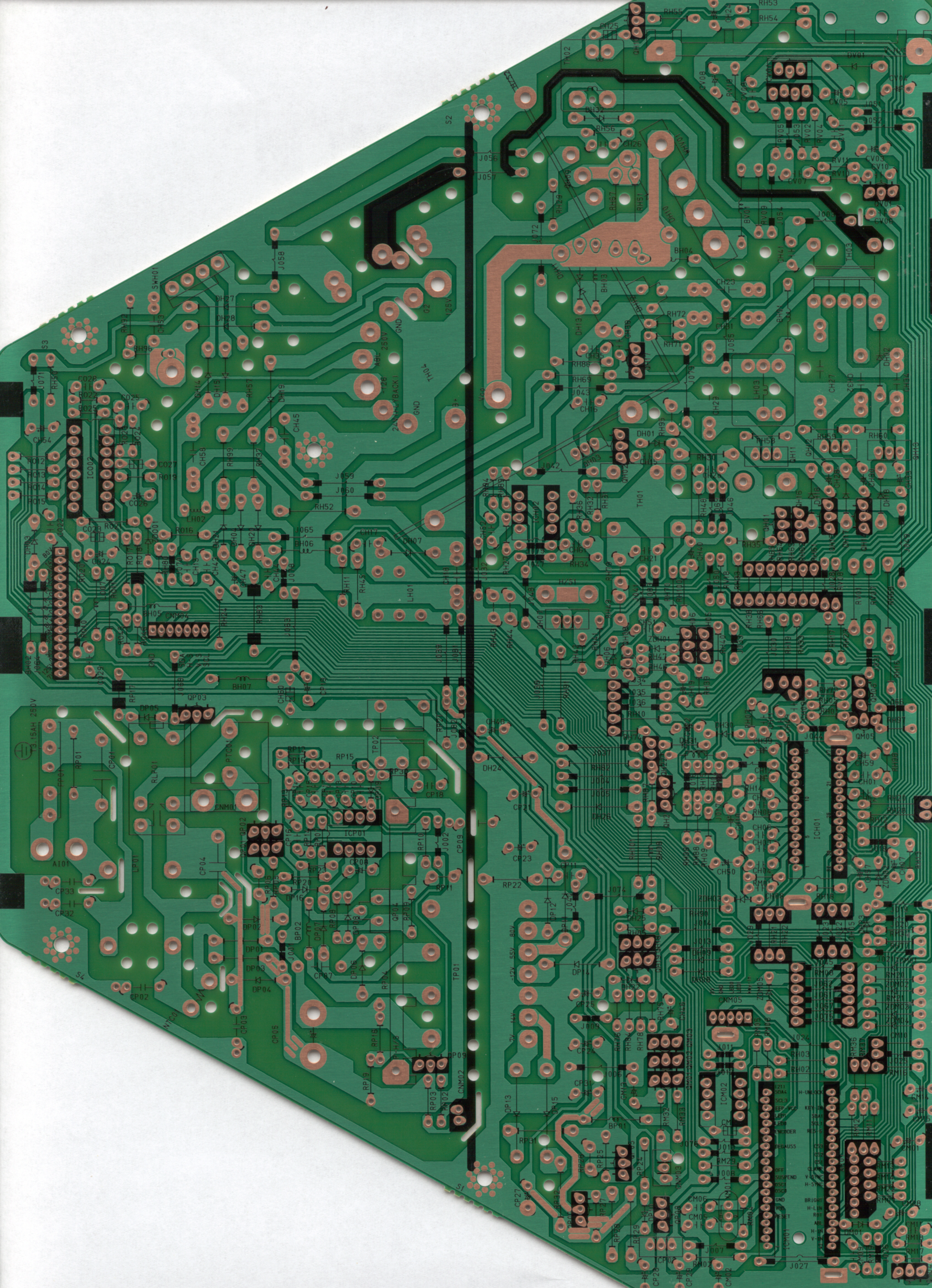


35.ICC01 PIN19



36.SK01 G1




S1
S2
S3
S4
T3.15AH 250V
AI01
CNM01
CNM02
CNM05
ICP01
ICH01
ICM02
IC001
TP01
TP02
TH01
TH02
TH03
TH04
SWH01
RLP01
LP01
LH01
PTC01
J056
J057
J058
J059
J060
J065
J027
GND
G2
35V
Vcc
12V
55V
80V
REF_AUDIO
RP01
RP22
RP31
RH52
RH55
RH54
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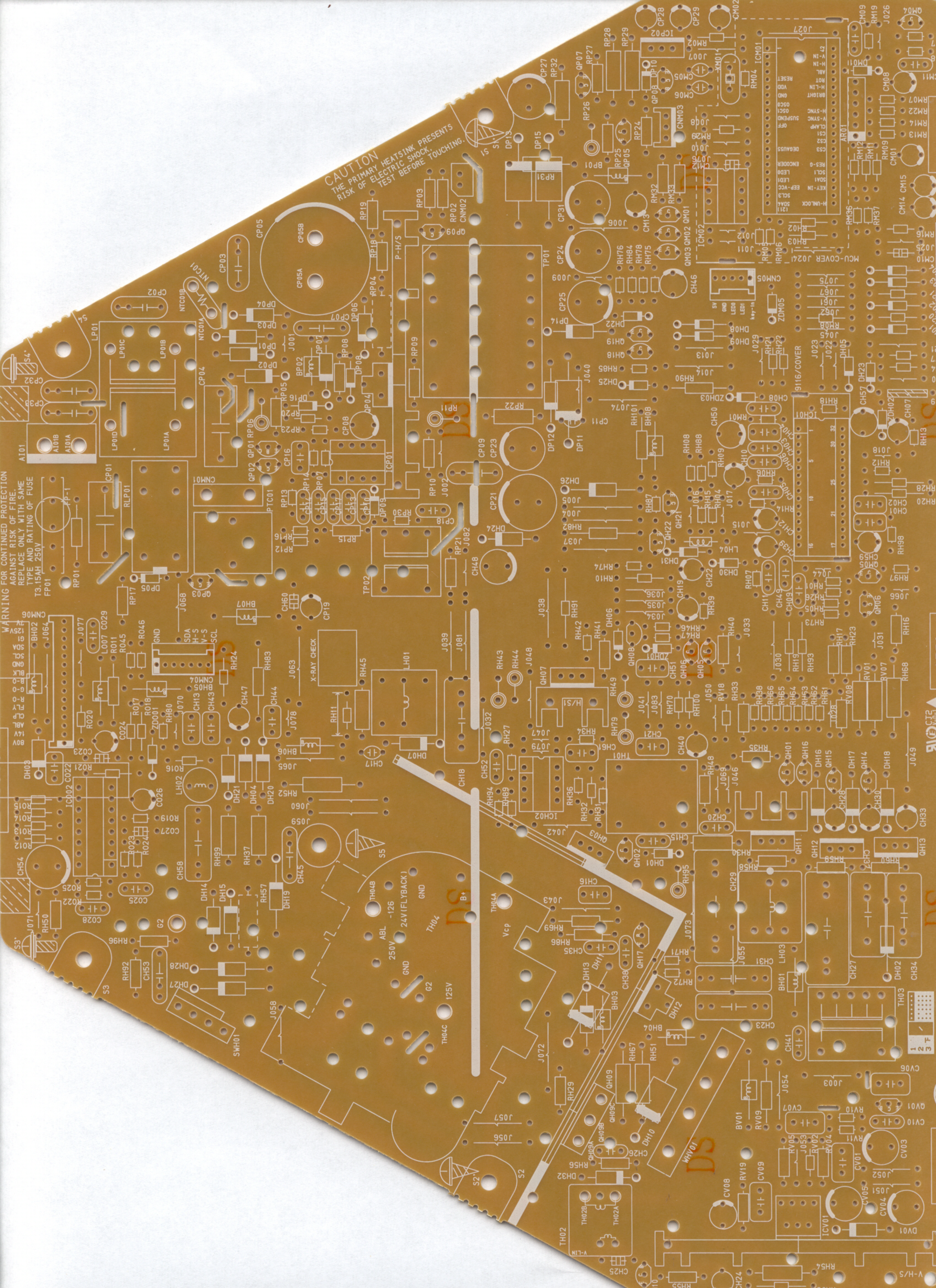
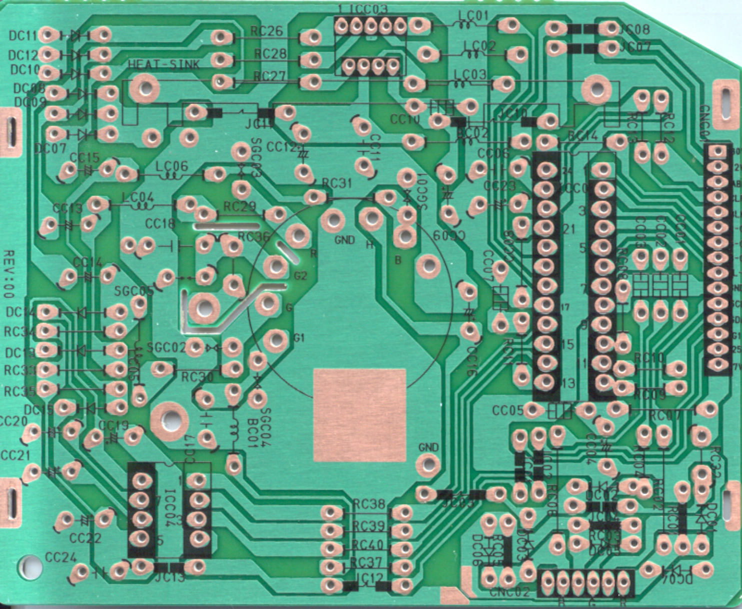
QP03
QP05
QP09
QM05
DV01


CAUTION
THE PRIMARY HEATSINK PRESENTS
RISK OF ELECTRIC SHOCK.
TEST BEFORE TOUCHING.
WARNING FOR CONTINUED PROTECTION
AGAINST RISK OF FIRE.
REPLACE ONLY WITH SAME
TYPE AND RATING OF FUSE
T3.15AH 250V
FP01
X-RAY CHECK
MCU-COVER J024
9116/COVER
ICM01
ICH01
ICH02
ICP01
LP01
TP01
TP02
LH01
TH04
ABL
-126
24V(FLYBACK)
GND
250V
G2
125V
B+
Vcp
80V
14V
CLP
FLY
R-O
G-O
BLK
SCL
SDA
7V
H-S
V-S
V-LIN
V-H/S
P-H/S
H/S1
SWH01
WHV01
DS



ICC03
LC01
LC02
LC03
JC08
JC07
RC26
RC28
RC27
HEAT-SINK
DC11
DC12
DC10
DC08
DC09
DC07
JC11
CC10
BC02
JC10
CC12
CC11
SGC03
RC13
RC12
RC14
CNC01
CC15
LC06
CC06
CC23
LC04
RC31
SGC01
RC29
CC13
CC18
RC36
GND
H
B
R
CC09
RC08
CC07
CC03
CC02
CC01
CC14
G2
REV:00
SGC05
G
DC14
RC34
DC13
RC33
RC35
DC15
SGC02
RC30
G1
RC11
CC16
RC10
RC09
CC05
RC07
CC04
CC20
CC19
CC17
SGC04
BC01
CC21
GND
RC32
ICC04
RC06
RC04
RC02
JC03
DC02
RC38
RC39
RC40
RC37
JC12
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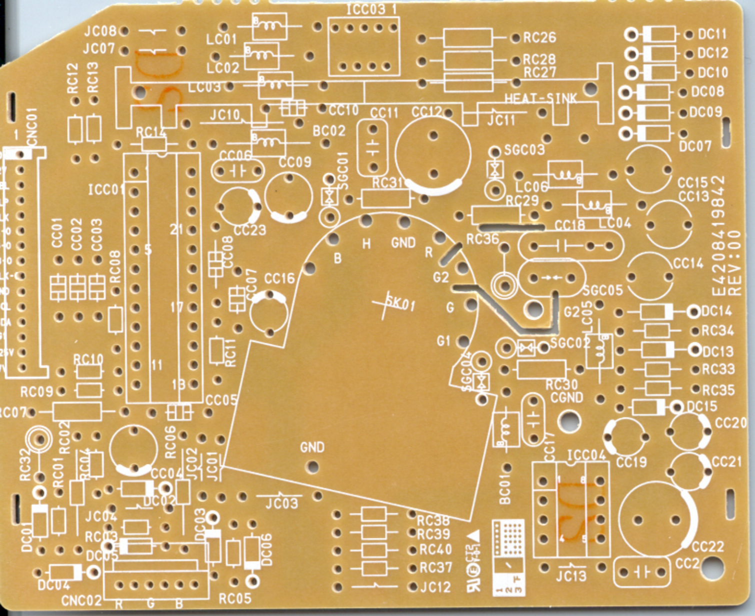
CC24
JC13
DC06
RC05
DC03
RC03
DC05
RC01
DC01
DC04
CNC02


JC08
JC07
LC01
LC02
LC03
ICC03 1
RC26
RC28
RC27
DC11
DC12
DC10
DC08
DC09
DC07
HEAT-SINK
JC11
CC10
CC11
CC12
RC12
RC13
CNC01
1
JC10
RC14
BC02
CC06
CC09
SGC01
RC31
SGC03
LC06
RC29
LC04
CC15
CC13
ICC01
CC01
CC02
CC03
RC08
5
21
17
11
13
CC23
CC08
CC07
CC16
H
GND
B
R
G2
G
G1
SK01
RC36
CC18
CC14
SGC05
G2
LC05
DC14
RC34
DC13
RC33
RC35
E4208419842
REV:00
SGC02
SGC04
RC30
CGND
DC15
CC20
CC19
CC21
RC10
RC09
RC07
RC11
CC05
RC06
RC02
RC32
RC01
RC04
CC04
JC02
JC01
GND
JC03
DC02
JC04
RC03
DC03
DC01
DC05
DC06
DC04
CNC02
R
G
B
RC05
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CC17
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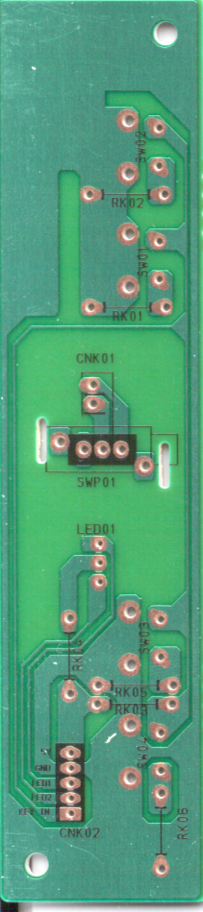
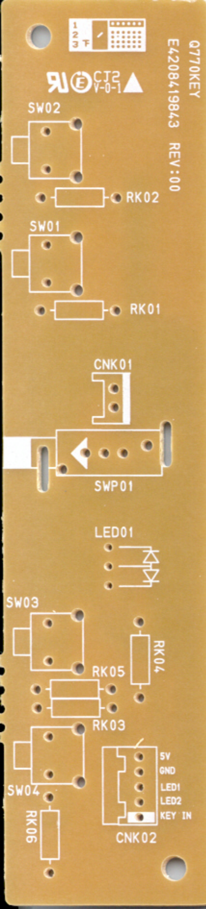
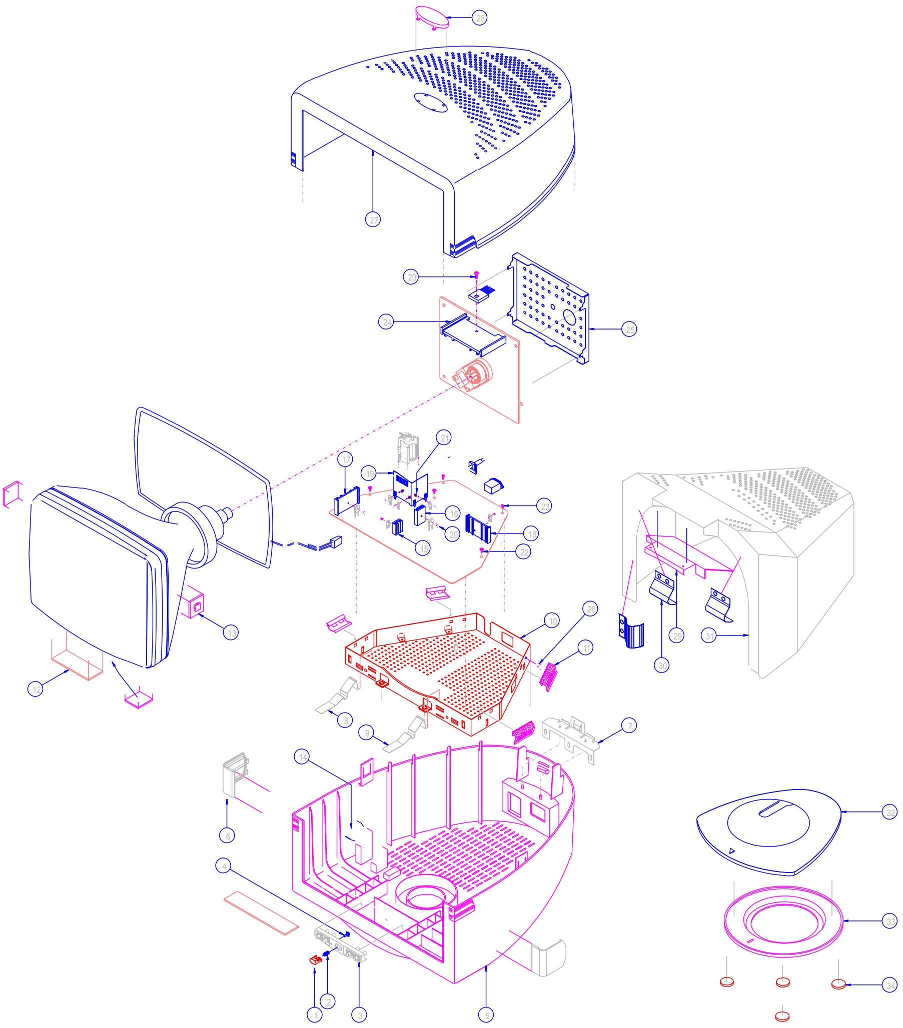
8
4
5
JC13
CC22
CC2


SW02
RK02
SW01
RK01
CNK01
SWP01
LED01
SW03
RK04
RK05
RK03
SW04
5V
GND
LED1
LED2
KEY IN
CNK02
RK06


1
2
3
Q770KEY
E4208419843 REV:00
CT2
V-0-1
SW02
RK02
SW01
RK01
CNK01
SWP01
LED01
SW03
RK04
RK05
RK03
SW04
5V
GND
LED1
LED2
KEY IN
RK06
CNK02



NO.	PART NO.	PART NAME	DESCRIPION	QT'Y	품 명
34	6262005000	RUBBER BOTTOM	SJ-5816 POLYURETHANE	4	
33	6120050700	BOTTOM PLATE	SECC T=2.0	1	
32	6201296000	SWIVEL BASE	ABS 94HB	1	
31	6120050200	SHLD-CASE COVER ASSY	Al050P T=0.3	1	
30	6120051600	GROUND SPRING	C5210H T=0.1	2	
29	6225033000	INSULATION ANODE	ABS+PC	1	
28	6201296200	CAP GATE	ABS 94HB	1	
27	6201295700	TOP COVER	ABS 94HB	1	
26	M17744006012	SCREW BIN(+) 4x6 MSZPC	MSZPC	1	
25	6120050900	SHLD-PL, FENCE CRT ASSY	SPTE T=0.3	1	
24	6124035603	HEAT SINK V	Al050P	1	
23	5004000204	SCR-TT.WAL 3*8	MSZPC	2	
22	6129027600	SPECIAL, T.T/W(+) 3*8	MSZPC	3	
21	M31100030012	NUT HEX, 6N1-3	MSZPC	3	
20	M11143008012	SCREW,BIN(+) 3x8 MSZPC	—	8	
19	6120051000	F/SHIELD FBT ASSY	Al050P	1	
18	6124035602	HEAT SINK V	Al050P	1	
17	6124035600	HEAT SINK V	Al050P	1	
16	6124020510	HEAT SINK POWER	Al050P	1	
15	6124020508	HEAT SINK POWER	Al050P	1	
14	6262005100	RUBBER PLATE	SJ-5816 POLYURETHANE	2	
13	6223076900	MOUNT BASE V770	—	3	
12	6225033100	INSULATION CRT	P.E	1	
11	6120042800	GROUND SPRING,V770	SUS 304	4	
10	6101218100	CHASSIS MAIN,Q770	SECC T=0.8	1	
9	6120050400	GROUND CRT RIGHT	SPTE T=0.3	1	
8	6120051100	GROUND CRT LEFT	SPTE T=0.3	1	
7	6120050300	SHIELD PLATE	SPTE T=0.3	1	
6	6201295900	COVER CAP	ABS+PC	2	
5	6201295800	BOTTOM COVER	ABS 94HB	1	
4	6220084900	LENS LED POWER	LUCKY PMMA IF 850	1	
3	6215237100	KNOB V/R	ABS 94HB	1	
2	6155037600	SPRING COM.	SUS 304	1	
1	6215237000	KNOB POWER	ABS 94HB	1	

DRAWN BY	PLANNED BY	CHECKED BY	APPROVED BY
KIM JIN PYEONG		M.H.RYU	J.S.KIM
2001.07.27		2001.07.27	2001.07.27

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN mm (INCHES)
TOLERANCES ARE,
LINEAR ± ANGLES ±
RADII UNLESS NOTED, ±

ANGLE 3rd
SCALE N/S
MDL Q770
REF NO.
SIZE A1

TITLE EXPLODED VIEW
REV A
DWG NO. B4210012301A
SHEET 1/1
FILE NAME :